BreezeACCESS V

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System Manual

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Electronic Emission Notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Radiation Hazard Warning

To comply with FCC RF exposure requirements in section 1.1307, a minimum separation distance of 2 m (79 inches) is required between the antenna and all persons:

Safety Considerations

For the following safety considerations, "Instrument" means the BreezeACCESS units' components and their cables.

Caution

To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

BS-GU Lithium Battery

Caution: Danger of battery explosion if incorrectly replaced or disposed of. Replace only with the same or equivilant type battery, as recommended by the manufactuer. Dispose of used batterys according to manufactuer's instructions.

Line Voltage

Before connecting this instrument to the power line, make sure that the voltage of the power source matches the requirements of the instrument.

Power Cord

Use only the power cord supplied with the unit.

Radio

The instrument transmits radio energy during normal operation. To avoid possible harmful exposure to this energy, do not stand or work for extended periods of time in front of its antenna. The long-term characteristics or the possible physiological effects of Radio Frequency Electromagnetic fields have not been yet fully investigated.

Outdoor Unit and Antenna Installation and Grounding

Be sure that the outdoor unit, the antenna and the supporting structure are properly installed to eliminate any physical hazard to either people or property. Verify that the outdoor unit and the antenna mast (when using external antenna) are grounded so as to provide protection against voltage surges and static charges. Make sure that the installation of the outdoor unit, antenna and cables is performed in accordance with all relevant national and local building and safety codes.

This equipment can be operated in the range of frequency and transmitted power in accordance with National Radio Regulations. The manufacturer is not responsible for the changes and modifications made by the user

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.

NOTE:

The currently released BreezeACCESS V product line does not include certain products and features which are described in this manual. These include the following:

- SU-E Subscriber units with a connector for an external antenna
- Subscriber Units with voice support
- BreezeMANAGE

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BreezeACCESS V

Version 4.3

Revision 4.0

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System Description

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Chapter 1

Introduction

About This Chapter

This chapter introduces the BreezeACCESS system, its components and its functions.

Introducing BreezeACCESS

BreezeACCESS IP Broadband Wireless Access system is an IP based access system that supports wireless data and voice services, employing wireless packet-switched data technology to support high-speed IP services, including fast access to the Internet and Virtual Private Networks.

BreezeACCESS users are provided with a network connection that is always on, supporting access to the Internet and other IP services at data rates of up to 3 Mbps. BreezeACCESS can also support high quality telephony using the ITU-T H.323 industry standard for Voice over IP communications. The system is designed for cellular-like deployment, allowing systems of various sizes and structures to be constructed. A system may include any number of cells, each containing several Access Units, to better cover densely populated areas.

The BreezeACCESS system allows the Maximum (data burst) Information Rate (MIR) and Committed Information Rate (CIR) for both uplink and downlink to be defined separately for each subscriber.

This enables a variety of Class of Service (CoS) packages, bandwidth allocations and traffic-shaping schemes. In addition, the system supports Virtual LANs based on IEEE 802.1Q, enabling secure operation and Virtual Private Network (VPN) services as well as allowing tele-workers or remote offices to conveniently access their enterprise networks. The system also supports Layer 2 traffic prioritization according to IEEE 802.1p and ToS based Layer 3 traffic prioritization according to RFC791.

BreezeACCESS V operates in Time Division Duplex (TDD) mode. It employs wireless packet data switching technology, utilizing Frequency Hopping Spread Spectrum (FH-SS) radios.

BreezeACCESS V systems are available in the following frequency bands:

Series (band)	Frequency Band
5.2	5.150-5.350 GHz
5.7	5.725-5.850 GHz

BreezeACCESS V units operating in the 5.7 GHz band are available with one of the following options:

- **US Option** – The available band ranges from 5.725 GHz to 5.850 GHz. This option supports the standard ISM US FCC Frequency Hopping sequence that includes 79 frequencies. Synchronization among AUs is not supported.

- **INT (International) Option** – The available band ranges from 5.725 GHz to 5.850 GHz. Two hopping sequence selection modes are supported as follows:

  a. INT ISM mode: This option supports the standard ISM US FCC Frequency Hopping sequence that includes 79 frequencies. Synchronization among AUs is supported.

  b. Flexible Hopping Mode: Enables the selection of hopping frequencies in the supported range. Synchronization among AUs is supported.

A BreezeACCESS-based system consists of the following:

- **Customer Premise Equipment (CPE)** – BreezeACCESS Subscriber Units.
- **Base Station Equipment (BSE)** – BreezeACCESS Access Units and supporting equipment.
- **Networking Equipment** – Standard Routers and/or Gateways/Gatekeepers supporting connections to the Internet and/or the PSTN or private telephony network.
- **Management Systems** – SNMP based Management, Billing and Customer Care, and other Operations Support Systems.

Chapter 2

System Components

About This Chapter

This chapter describes BreezeACCESS system components. It includes the following sections:

- **Subscriber Units (Customer Premises Equipment), page 2-2**, describes BreezeACCESS equipment installed at the customer's premises.
- **Base Station Equipment, page 2-4**, describes the equipment used in BreezeACCESS Base Stations.
- **Networking Equipment, page 2-8**, describes how BreezeACCESS Base Station units are connected to one another and to other equipment in a network environment.
- **Management Systems, page 2-8**, introduces the management features built into the BreezeACCESS system and describes the use of various standard and proprietary management systems.

Subscriber Units (Customer Premises Equipment)

The BreezeACCESS Subscriber Unit (SU) installed at the customer premises provides data only or data and telephone connections. The data connection is a standard IEEE 802.3 Ethernet 10BaseT (RJ 45) interface while the voice connection (in units that support voice) is a standard RJ 11 Plain Old Telephone (POTS) interface.

The Subscriber Unit provides an efficient platform for high rate Internet and Intranet services, providing subscribers with fast access to IP based services at a burst data rate of up to 3 Mbps. The use of packet switching technology provides the user with a connection to the network that is practically always on, allowing for immediate access to services.

SU-A/E Units with an Outdoor Radio Unit and Antenna

SU-A and SU-E series Subscriber Units are comprised of an indoor unit (SU-NI) and an outdoor unit.

- In the SU-A series, the outdoor unit (SU-RA) contains the radio module and an integral flat antenna.
- In the SU-E series, the outdoor unit (SU-RE) contains the radio module and an RF connector for an external antenna.

The indoor SU-NI unit connects to the user's equipment and is powered from the mains via its SU-PS power supply unit. The SU-NI is connected to the outdoor unit via a 50-ohm coaxial Intermediate Frequency (IF) cable. This cable carries 440 MHz IF signals between the indoor and the outdoor units and also serves for transferring power (12 VDC), management and control signals from the indoor unit to the outdoor unit.

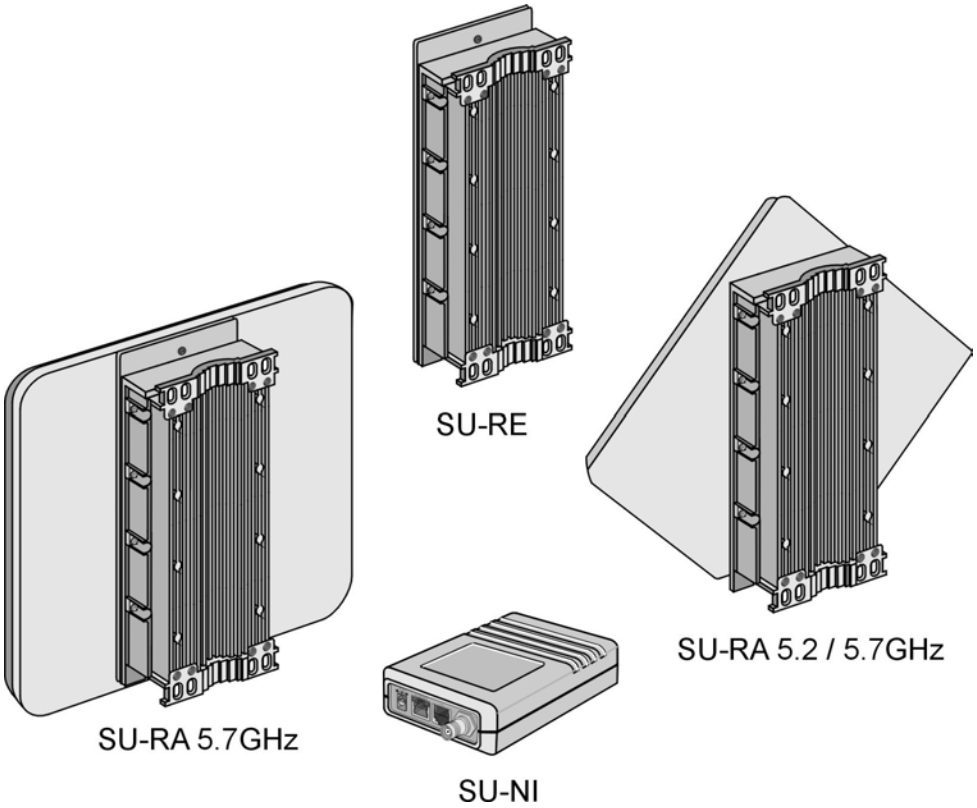

Figure 2-1: BreezeACCESS SU-A/E Outdoor and Indoor Units

NOTE:

Units operating in the 5.7 GHz band are supplied either with a rectangle shaped antenna (left of figure), or with a diamond shaped antenna (right of figure).

The following products are available:

Data-only Units:

SU-X-1D- FF	The unit supports one Ethernet device.
SU-X-BD- FF	The unit provides bridge functionality and can support up to a full LAN.

Data and Voice Units:

SU-X-1D1V- FF	The unit supports one Ethernet device and has an interface to a standard analog telephone set (POTS).
SU-X-BD1V- FF	The unit provides bridge functionality and can support a full LAN. It also has an interface for a standard analog telephone (POTS).

X=A: The outdoor radio unit includes an integral high gain flat antenna
X=E: The outdoor radio unit has a connector for an external antenna.

FF: The radio band supported by the unit (5.2 or 5.7 GHz).

Base Station Equipment

The BreezeACCESS Access Units (AU) installed at the base station site provide all the functionality necessary to communicate with the remote Subscriber Units as well as to connect to the backbone of the service provider. Each AU connects to the network through a standard IEEE 802.3 Ethernet 10BaseT (RJ 45) interface.

There are 2 lines of Access Units with different architectures:

- Modular Base Station Equipment
- Standalone “Micro-Cell” Access Unit

Modular Base Station Equipment

The Base Station equipment is based on the BS-SH 3U chassis, which is suitable for installation in 19” racks. The chassis contains one or two power supply modules, up to six active Access Unit Network Interface (BS-AU) modules and an optional BS-GU GPS and Alarms module.

Two different types of power supply modules are available: the BS-PS which is powered from a –48 VDC power source, and the BS-PS-AC, powered from the 110/230 VAC mains. The optional use of two power supply modules is for fail-safe operation through power supply redundancy.

Each BS-AU module, together with its outdoor radio unit comprises an AU-E-BS Access Unit that serves a single sector. The AU-RE outdoor unit contains the radio module and a RF connector for a separate external antenna.The BS-AU modules connect to the network through standard IEEE 802.3 Ethernet 10BaseT (RJ 45) interfaces. A coaxial Intermediate Frequency (IF) cable connects the indoor module to the outdoor unit. This cable carries 440 MHz IF signals, power (12 VDC) and management and control signals from the indoor unit to the outdoor unit.

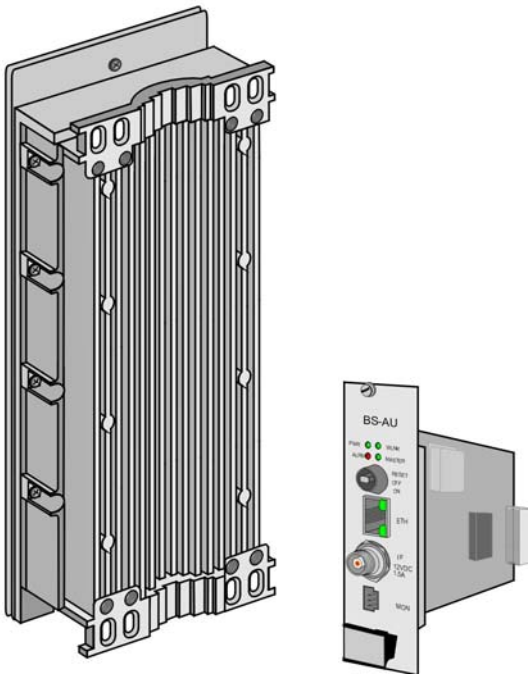

Figure 2-2: BreezeACCESS Base Station Module and Outdoor Unit

GU-A-BS GPS and Alarms System

The optional GU-A-BS system can be used to synchronize the frequency hopping mechanisms of collocated AU-E-BS BreezeACCESS units (where such synchronization is permitted by local regulations) as well as to provide alarm management.

The GU-A-BS system is comprised of two units:

- An outdoor GPS Receiver and Antenna unit, the GU-RA.
- An indoor GPS and Alarms module, the BS-GU.

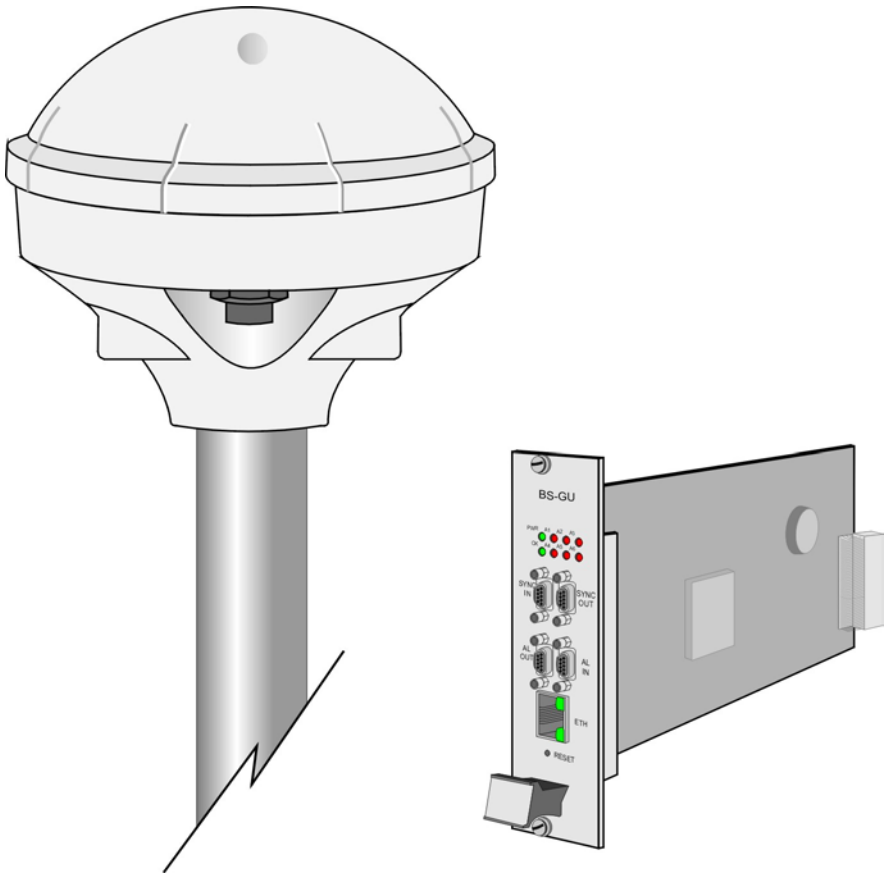

Figure 2-3: BreezeACCESS GU-A-BS System Components

The BreezeACCESS BS-GU module is designed to be inserted into the BS-SH 19" base station chassis to provide hopping synchronization signals to the BS-AU Access Unit modules. The card uses timing signals derived from signals received from the GU-RA GPS antenna. These signals, generated by the GPS global satellites network, allow accurate synchronization of systems located in different locations. Any number of base stations can be synchronized, guaranteeing that all AUs (Access Units) hop in unison from frequency to frequency. In addition, the GPS signal insures that all units begin their pre-defined hopping sequence at the same time.

The BS-GU module is connected to the GU-RA GPS antenna via a cable that carries power from the module to the antenna, timing signals from the antenna to the module and management signals between the two units.

The BS-GU also provides synchronization signals to other BS-GU modules by daisy-chaining any number of modules, using a single GU-RA GPS antenna to synchronize multiple AUs in several collocated BS-SH chassis.

When a GU-RA GPS antenna is not connected to the module (or if the connected GPS antenna is not functioning properly), the BS-GU module provides self-generated synchronization signals to all AUs.

Daisy-chained BS-GU modules use the synchronization signals generated by the first module in the chain (the Master module.

The BS-GU module also supports the management of alarm inputs and outputs. The module receives Alarms In indications from other BreezeACCESS modules in the base station shelf (internal alarms) and external alarms from other devices via the AL IN connector. Alarms Out management allows activation of external devices upon occurrence of user-defined events, using relays via the AL OUT connector.

AU-E-NI Standalone "Micro-Cell" Access Unit

The AU-E-NI is a standalone Access Unit that is very similar to the AU-E-BS unit, the only difference being that the indoor unit, the AU-NI, is a standalone desktop or wall-mountable unit rather than a 19" module.

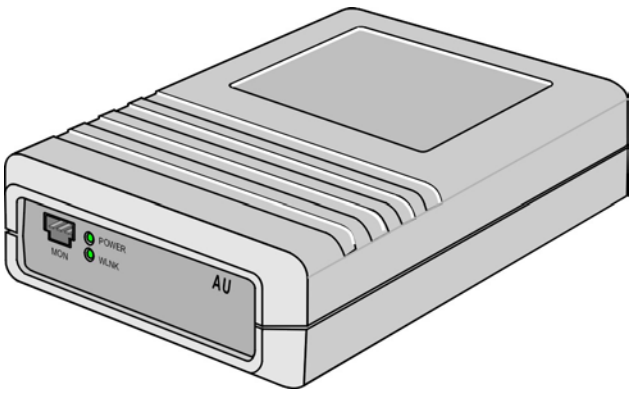

Figure 2-4: BreezeACCESS AU-NI Unit

The AU-RE outdoor unit is identical to that of the AU-E-BS line. The AU-NI indoor unit is powered from the mains (100-250 VAC) through an external power transformer and connects to the network through a standard IEEE 802.3 Ethernet 10BaseT (RJ 45) interface. A coaxial Intermediate Frequency (IF) cable connects between the AU-NI indoor unit and the outdoor unit. This cable carries 440 MHz IF signals, power (12 VDC) and management and control signals from the indoor unit to the outdoor unit.

Networking Equipment

The base station equipment is connected to the backbone through standard data communication and telecommunication equipment. For improved security, the 10BaseT ports of the AU modules are connected directly to a multi-port router. This router is connected by any means of point-to-point link to the backbone. In cases where security is less important and cost is the main concern, the Access Units can be connected to an Ethernet switch and then to a single port router.

The point-to-point link from the base station to the backbone may be wired or wireless links. The data to the Internet is routed to the Internet backbone through standard routers. The voice traffic is routed via standard Gateways/Gatekeepers to the PSTN.

Management Systems

The end-to-end IP based architecture of the system allows full management of all components from any point in the system. BreezeACCESS components can be managed using standard management tools through SNMP (Simple Network Management Protocol) agents that implement standard and proprietary MIBs for remote setting of operational modes and parameters. The same SNMP management tools can also be used for management of other system components including Switches, Routers, Gateways/Gatekeepers and transmission equipment.

The Ethernet WAN can also be used to connect to other Operation Support Systems including servers, Customer Care systems and AAA (Authentication, Authorization and Admission) tools.

BreezeMANAGE

Alvarion's SNMP-based BreezeMANAGE network management application provides a powerful tool for configuring, controlling, monitoring and effectively managing BreezeACCESS networks from a single, central network management station. BreezeMANAGE, together with the powerful tools available through its use under leading network management platforms, provides numerous benefits to operators of BreezeACCESS networks.

BreezeMANAGE system requirements are:

- **BreezeMANAGE for SNMPc***:* Castle Rock Computing SNMPc version 5.0.7d or higher (excluding 5.0.8), running under Windows 98/2000/NT.
- **BreezeMANAGE for HP-OV under UNIX***:* HP OpenView version 5.0.1 or higher running on a UNIX machine under Solaris Version 2.5 or higher.
- **BreezeMANAGE for HP-OV under NT***:* HP OpenView version 5.0.1 or higher running on a PC under Windows NT version 4.0 or higher with service pack 5.
- **Client***:* Any system supported by the network management platform such as HP-UX Xterm (HP-OV) or Windows 95/98/2000/NT.
- **Database***:* Any database supported by the network management platform such as Oracle, Sybase, Informix or Ingress.

NOTE:

The currently released version of BreezeMANAGE (SW version 4.0.6) does not support BreezeACCESS V units.

BreezeCONFIG

The BreezeCONFIG ACCESS configuration utility can also be used to manage BreezeACCESS system components. It is an SNMP-based application that provides a consistent view of the network and the system administrator can use it to control a large number of units from a single location.

BreezeCONFIG has the following system requirements:

- Windows 95/98/NT/2000/ME/XP
- 128 MB RAM recommended, 64 MB Minimum

Some of the features BreezeCONFIG supports are:

- Verifying units' status and current configuration
- Changing the configuration of a selected unit
- Simultaneously changing the configuration of multiple units
- Viewing traffic statistics and performance data
- Monitoring traps
- Performing firmware upgrade to a single or multiple units

NOTES:

The BreezeCONFIG utility can be downloaded from the Alvarion Web site: www.alvarion.com.

Chapter 3

Specifications

About This Chapter

This chapter lists the technical specifications of BreezeACCESS and includes the following sections:

- **System Specifications, page 3-2**, outlines the technical specifications of the BreezeACCESS system.
- **Physical Specifications, page 3-7**, lists the physical and electical specifications for different types of BreezeACCESS units.

System Specifications

Radio and Modem 5.2 GHz Band

Parameter	Value
Operation Mode	Time Division Duplex
Radio Access Method	FH-CDMA
Antenna Port	N-Type connector, 50 ohm The tested external sector antenna for the AU: 16 dBi, 5.150-5.875 GHz, 60° Horizontal x 10° Vertical, vertical polarization, EN 302 085
Maximum Input Power (at antenna port)	-20 dBm
Gross Bit Rate	1, 2, 3 Mbps
Modulation	GFSK modulation, with 2, 4, 8 modulation states (1, 2, 3 bits / symbol).
Symbol Rate	1 Msymbol/sec

Parameter	Value		
Frequency	5.15-5.35 GHz		
Channel Bandwidth	2 MHz		
Central Frequency Resolution	1 MHz		
SU-RE Antenna	21dBi, 10.5° horizontal x 10.5 ° vertical, vertical polarization, EN 302 085 V1.1.1, Range 1, Class TS 1, 2, 3, 4, 5 compliant		
Output Power (at antenna port)	25 dBm typical. Power Control Range: 20 dB		
Receive Normal Sensitivity (at antena port, BER 10E-6)	1 Mbps	2 Mbps	3 Mbps
	-91 dBm	-84 dBm	-76 dBm

Radio and Modem 5.7 GHz Band

Parameter	Value		
Frequency	5.725-5.850 GHz		
Standard Compliance	FCC Part 15.247, ETS 301 253		
Channel Bandwidth	1 MHz		
Central Frequency Resolution	1 MHz		
SU-RA Antenna	21dBi, 10° horizontal x 10° vertical, vertical polarization, EN 302 085 Class TS 3 range 1 compliant		
Output Power (at antenna port)	26 dBm typical. Power Control Range: 20 dB		
Receive Normal Sensitivity (at antena port, BER 10E-6)	1 Mbps	2 Mbps	3 Mbps
	-85 dBm	-78 dBm	-70 dBm

Data Communication

Parameter	Value
Standard Compliance	IEEE 802.3 CSMA/CD
VLAN support	Based on IEEE 802.1Q
Layer-2 Traffic Prioritization	Based on IEEE 802.1p
Layer-3 Traffic Prioritization	ToS according to RFC791
MIR (Maximum Information Rate) and CIR (Committed Information Rate)	Programmable for each user, separately for uplink and downlink. Range: 0 – 2200 Kbps, 1 Kbps resolution.

Voice/Fax (Subscriber Units with voice support)

Parameter	Value
Standard Compliance	ITU-T H.323 Ver. 2 VoIP standard
Compression	G.711 (A-Law and μ-Law) - 64 Kbps (transparent) G.723.1 - 6.3 Kbps G.729 - 8 Kbps (G.729, G.729 with Annex A and/or Annex B)
Silence Compression	G.723.1 - Voice Activity Detection (VAD), G.729 - Annex B
Echo Cancellation	ITU-T G.168 and G.131
Fax Transmission	According to T.38 Protocol

Telephony (Subscriber Units with voice support)

Parameter	Value
Call Progress Tones	Selectable per country standard or user definable
Line Type	Loop Start
On-hook Voltage	-48 V
Ringer Voltage	Min. 50 V r.m.s. unbalanced
Ringer Frequency	Selectable: 17, 20, 25, 50 Hz
REN	Max. 2
Off-hook DC current	30mA
Off-hook impedance	600 ohm or complex
Maximum input level	+3 dBm
Cable length	Max. 300 m, 26 AWG

IF Indoor – Outdoor Communication (SU-A/E, AU-E-NI, AU-E-BS)

Parameter	Value
IF Frequency	440 MHz
IF Cable Impedance	50 ohm
Maximum IF Cable Attenuation	15 dB
Maximum IF Cable DC Resistance	1.5 ohm

Configuration and Management

Parameter	Value
Management Options	a. Via the MON port, using terminal emulation with the built-in monitor program b. Telnet, using the monitor program c. TFTP, using the Configuration upload/download utility d. SNMP
Remote Management Access	From Wired LAN, Wireless Link
Management Access Protection	a. Multilevel password b. Configuration of remote access direction (from Ethernet only, from wireless link only or from both sides) c. Configuration of IP addresses of authorized stations
SNMP Agents	SNMP ver 1 client. MIB II, Bridge MIB, Private BreezeACCESS MIB

Parameter	Value
Security	a. Association protocol – ESSID b. RC4 WEP option (encryption of the authentication process) c. VLAN according to IEEE 802.1Q d. IP level filtering for user addresses or protocols e. Access direction and IP address filtering for management
Authentication and Accounting	RADIUS client in the SU according to RFC 2865 and 2866
Allocation of IP Parameters	Configurable or automatic (DHCP client)
Software Upgrade	Via TFTP

GU-RA GPS Radio

Parameter	Value
General	L1 frequency, C/A code (SPS) continuous tracking receiver
Update Rate	1 Hz

GU-RA to BS-GU Communication

Parameter	Value
Physical interface	RS 422
Cable Type	EIA RS 422 3 x 2 x 26AWG + 1 x 2 x 24 AWG FTP Shielded. 3 x 26 AWG twisted pairs for RS 422 communication and 1x 24 AWG pair for power supply
Cable Impedance	100 +/- 15 ohm @ 1 MHz (RS 422 pairs)
DC Resistance	RS 422 pairs: 145 ohm/km Power supply pair: 94 ohm/km
Maximum Cable Length	120 meters

Environmental

Parameter	Unit	Value
Operating Temperature	Outdoor Units	-40^0C to 55^0C (GU-RA: -40^0C to 85^0C)
	Indoor equipment	0^0C to 40^0C
Operating Humidity	Outdoor Units	5%-95% non-condensing, weather protected
	Indoor equipment	5%-95% non-condensing

Standards Compliance, General

Type	Standard
EMC	FCC part 15 (5.7 series), EN 300 385
Safety	UL 1950, EN 60950
Environmental	ETS 300 019 part 2-3 class 3.2E for indoor units ETS 300 019 part 2-4 class 4.1E for outdoor units
Radio	FCC part 15.247, ETSI ETS 301 253

Physical Specifications

SU-A/E Subscriber Unit

Connectors

Unit	Connector	Description
SU-NI	IF	TNC jack, 50 ohm, lightning protected
	ETH	10BaseT Ethernet (RJ 45) with 2 embedded LEDs. Cable connection to a PC: straight
	TEL (units with voice support)	RJ 11 jack (POTS)
	DC-12 V	DC phone jack for the SU-PS power supply
	MON	RS 232, 3-pin low profile jack
SU-RE	IF	TNC jack, 50 ohm, lightning protected
	ANT	N-Type jack, 50 ohm, lightning protected
SU-RA	IF	TNC jack, 50 ohm, lightning protected

Electrical

Unit	Details
General	Power consumption: 25 W
SU-NI	External power supply AC input power: 100-240 Vr.m.s., 47-63 Hz DC power output: 12 V, 4 A
SU-RA, SU-RE	12 VDC from the SU-NI unit over the IF cable

Mechanical

Unit	Structure	Dimensions	Weight
General	An indoor SU-NI unit with an external SU-PS power supply unit and an outdoor SU-RE or SU-RA radio unit		
SU-NI	Metal box, desktop or wall mountable	15 x 8.7 x 3.7 cm	0.34 kg.
SU-PS	Desktop unit, 1.5 m DC cable	12 x 6 x 3.6 cm	0.28 kg.
SU-RE	Metal box, pole or wall mountable	30.8 x 12 x 4.7 cm	1.58 kg.
SU-RA 5.7 GHz	Metal box plus an integral antenna in plastic enclosure, pole or wall mountable	30.6 x 30.6 x 7.2 cm (30.6 x 12 x 4.7 cm + 30.6 x 30.6 x 2.5 cm)	3.1 kg.

Unit	Structure	Dimensions	Weight
SU-RA 5.2 GHz	Metal box plus an integral antenna in a cut diamond shape in plastic enclosure, pole or wall mountable	43.2 x 30.2 x 5.9 cm (30.6 x 12 x 4.7 cm + 43.2 x 30.2 x 1.2 cm)	

AU-E-NI Stand-Alone Access Unit

Connectors

Unit	Connector	Description
AU-NI	IF	TNC jack, 50 ohm, lightning protected
	ETH	10BaseT Ethernet (RJ 45) with 2 embedded LEDs Cable connection to a PC: crossed
	DC-12 V	DC phone jack for the AU-PS power supply
	MON	RS 232, 3-pin low profile jack
AU-RE	IF	TNC jack, 50 ohm, lightning protected
	ANT	N-Type jack, 50 ohm, lightning protected

Electrical

Unit	Details
General	Power consumption: 25 W
AU-NI	External power supply AC input power: 100-240 Vr.m.s., 47-63 Hz DC power output: 12 V, 4 A
AU-RE	12 VDC from the AU-NI unit over the IF cable

Mechanical

Unit	Structure	Dimensions	Weight
General	An indoor AU-NI unit with an external AU-PS power supply unit and an outdoor AU-RE radio unit		
AU-NI	Metal box, desktop or wall mountable	15 x 8.7 x 3.7 cm	0.34 kg
AU-PS	Desktop unit, 1.5 m DC cable	12 x 6 x 3.6 cm	0.28 kg
AU-RE	Metal box, poll or wall mountable	30.6 x 12 x 4.7 cm	1.58 kg

Modular Base Station Equipment

Connectors

Unit		Connector	Description
AU-E-BS	AU-BS	IF	TNC jack, 50 ohm, lightning protected
		ETH	10BaseT Ethernet (RJ 45) with 2 embedded LEDs Cable connection to a PC: crossed
		MON	RS 232, 3-pin low profile jack
	AU-RE	IF	TNC jack, 50 ohm, lightning protected
		ANT	N-Type jack, 50 ohm, lightning protected
BS-PS		-48V	3 pin DC power plug
BS-PS-AC		AC IN	3 pin AC power plug
BS-GU		ETH	10BaseT Ethernet (RJ 45) with 2 embedded LEDs Cable connection to a PC: straight
		SYNC IN	9-pin Micro D-Type jack, Molex 83619-9003 (mates with Molex 83421-9014 or similar); 4 contact closure alarm indicators
		SYNC OUT	9-pin Micro D-Type jack, Molex 83619-9003 (mates with Molex 83421-9014 or similar); 3 non-latching relays, rating = 24 V (DC or AC) @ 1 A max.
		AL IN	9-pin Micro D-Type jack, Molex 83619-9003 (mates with Molex 83421-9014 or similar)
		AL OUT	9-pin Micro D-Type jack, Molex 83619-9003 (mates with Molex 83421-9014 or similar)
GU-RA			12-pin round

Modular Base Station Equipment - Electrical

Unit	Details
General	200 W for a fully equipped chassis (1 PS, 6 AU, 1 GU)
BS-PS	DC power input: -48 V, 5.2 A max. DC power output: 12 V; 5 V
BS-PS-AC	AC power input: 85-256 VAC, 47-65 Hz, DC power output: 12 V; 5 V; 3.3 V (not used)
BS-AU	5 VDC, 12 VDC from the power supply module(s) via the back plane
AU-RE	12 VDC from the BS-AU over the IF cable
AU-BS (BS-AU module plus AU-RE outdoor unit)	Power consumption: 25 W
BS-GU	5 VDC, 12 VDC from the power supply module(s) via the back plane
GU-RA	12 VDC from the BS-GU over the connecting cable

Mechanical

Unit	Structure	Dimensions	Weight
BS-SH	19” rack (3U) or desktop installation	13 x 48.2 x 25.6 cm	4.76 kg
BS-PS	DC power supply module	12.9 x 7 x 25.3 cm	0.7 kg
BS-PS-AC	AC power supply module	12.9 x 7 x 25.3 cm	1.2 kg
BS-AU	Indoor module of the AU-BS access unit	12.9 x 3.5 x 25.5 cm	0.22 kg
AU-RE	Metal box, pole or wall mountable	30.6 x 12 x 4.7 cm	1.58 kg
BS-GU	Indoor module of the GU-A-BS	12.9 x 3.5 x 23 cm	0.22 kg
GU-RA	A plastic tubular enclosure, pole mountable	15.5 x 12.7 cm	0.363 kg

BreezeACCESS V

Version 4.3

Revision 4.0

System Manual Book 2: Installation

Installation

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Chapter 1

IF-Based Equipment

About This Chapter

This chapter describes the basic installation of BreezeACCESS IF-based equipment, including SU-A/E subscriber units, modular base station equipment and stand-alone AU-E-NI access units. It includes the following sections:

- **Packing Lists, page 1-2**, lists the equipment that is packed with each BreezeACCESS IF-based unit.
- **Guidelines for Selection of Equipment Locations, page 1-5**, gives tips and guidence for locating BreezeACCESS equipment for optimum performance.
- **Installing the Outdoor Unit, page 1-7**, explains how to install the outdoor elements of BreezeACCESS systems.
- **Installing the SU-NI and AU-NI Indoor Unit, page 1-12**, outlines the installation procedures for SU-NI and AU-NI units.
- **Installing Modular Base Station Equipment, page 1-14**, outlines the installation procedures for modular base station equipment.
- **Installing the GU-A-BS GPS and Alarms System, page 1-20**, outlines the installation procedures for a GPS and Alarms system.

Packing Lists

NOTE:

According to the FCC all IF Units (AU-E, SU-A, SU-E) should be installed by a professional installer only.

SU-A/E Subscriber Unit

- SU-NI Indoor unit
- Outdoor unit:

  SU-RA with integral antenna

  –Or–

  SU-RE with a connector to an external antenna (not included)
- SU-PS power supply with a mains power cord
- Pole mounting kit for the outdoor unit
- Wall mounting kit for the SU-NI unit

Modular Base Station Equipment

BS-SH Base Station Chassis

- BS-SH chassis (with blank panels)
- Rubber legs for optional desktop installation
- BS-PS DC power supply
- DC power cable
- Documentation CD

BS-SH-AC Base Station Chassis

- BS-SH-AC Chassis (with blank panels)
- Rubber legs for optional desktop installation
- BS-PS-AC AC Power Supply
- AC Power Cable
- Documentation CD

AU-E-BS Access Units (up to six per chassis)

- AU-RE with a connector to an external antenna (not included)
- Pole mounting kit for the outdoor unit
- BS-AU Network Interface module
- Monitor cable

BS-PS DC Power Supply (one or two per chassis)

- BS-PS power supply module
- DC power cable

BS-PS-AC Power Supply (one or two per chassis)

- BS-PS-AC power supply module
- AC power cable

GU-A-BS GPS and Alarms System

- BS-GU module
- GU-RA GPS antenna and receiver
- 1” threaded mounting pole for the GU-RA GPS antenna
- Antenna Mounting kit

Standalone AU-E-NI Access Unit

- AU-RE with a connector to an external antenna (not included)
- Pole mounting kit for the outdoor unit
- AU-NI indoor unit
- Wall mounting kit for the AU-NI unit
- AU-PS power supply with a mains power cord
- Monitor cable
- Documentation CD

Other Items Required for Installation

- IF cable* (available from Alvarion in different lengths)
- Grounding cable with an appropriate termination
- Antenna* and RF cable* according to specific installation conditions for units with external separate antennas
- Ethernet cable to connect the equipment to the Ethernet outlet (see Table 1-1, page 1-4)
- Telephone cord for connecting a Subscriber Unit with voice support to a telephone set (RJ 11 connector at the Subscriber Unit side)
- GPS cable (30, 60 or 120 meter – supplied separately according to order)*
- SYNC cable* – for daisy-chaining GPS modules (if necessary)

- Alarms-In and Alarms-Out cables* for the GPS module (if necessary)
- Installation tools and materials

For local configuration of parameters:

- A portable PC with Terminal Emulation software and Monitor cable* (Monitor cable is supplied with Access Units)

  –Or–

- A portable PC equipped with an Ethernet card and with Telnet software, and an Ethernet cable (see Table 1-1, page 1-4)

Items marked with an asterisk (*) are available as options from Alvarion.

NOTE:

The BS-GU does not have an external Monitor port and it should be configured via the Ethernet port using Telnet.

Table 1-1: Required Type of Ethernet Cable

Unit Type	Connection to a PC	Connection to a Hub
Subscriber Unit	Straight	Crossed
Access Units	Crossed	Straight
GPS module	Straight	Crossed

Guidelines for Selection of Equipment Locations

NOTE:

Outdoor units and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities.

Failure to do so may void the BreezeACCESS product warranty and may expose the end user or the service provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.

Select appropriate locations for the outdoor unit and for the indoor equipment using the following guidelines:

- The outdoor unit can be pole or wall mounted. Its location should allow easy access to the unit for installation and testing.
- The higher the antenna, the better the achievable link quality.

Units with an external antenna should be installed as near as possible to the antenna.

AU-RE

The external antenna connected to the AU-RE unit, should be installed where it provides coverage of all Subscriber Units in the area it is intended to serve. The higher the antenna, the better coverage it can provide.

NOTE:

The distance between any two antennas should be greater than 40 cm.

SU-RA and SU-RE

The SU-RA outdoor unit with its integrated antenna, or the external antenna connected to the SU-RE unit, should be installed where it has a direct line of sight with the Base Station antenna.

The antenna (integrated on the front side of the SU-RA outdoor unit or external if using SU-RE) should be directed towards the Base Station. The unit should be installed in a way that allows optimal alignment towards the Base Station.

IF Cable

The outdoor unit is connected to the indoor unit by means of an IF cable carrying signaling, control signals and power. The IF frequency is 440 MHz. The maximum allowed attenuation of the IF cable connecting the outdoor unit to the indoor unit is 15 dB at 440 MHz, and the maximum allowed DC resistance (the sum of the DC resistance of the inner and outer conductors) is 1.5 ohm. This allows for cable length of up to 30 m when using the standard RG 58 cable.

If longer cables are required, a cable with lower attenuation and/or DC resistance should be used. Table 1-2, page 1-6 provides details regarding some popular cables such as the RG 58 and RG 213. If the spectral environment is polluted with noise in the 440 MHz band, it is recommended to use a higher quality double-shielded cable such as the LMR 200, LMR 240 and LMR 400 (manufactured by Times Communications).

Table 1-2: IF Cables

Cable Type	RG 58	RG 213	LMR 200	LMR 240	LMR 400
Maximum cable length (m)	30	100	45	65	150

Indoor Equipment

The Indoor unit should be installed as close as possible to the point where the IF cable enters the building. The location of the indoor unit should also take into account the need to connect it to a power mains outlet and to the CPE.

NOTE:

The system complies with the ETS 300 385 standard and is protected against secondary lightning strikes when its outdoor unit is properly grounded according to the applicable country-specific industry standards for protection of structures against lightning. The system complies with EN 61000-4-5, test level 3 (2kV).

Installing the Outdoor Unit

NOTE:

Outdoor units must be installed by a professional installer only.

The Outdoor Unit Bottom Panel

The SU-RA outdoor unit includes the radio and an integral high-gain flat antenna located on the front of the unit. The SU-RE and AU-RE outdoor radio units have an RF connector for connection to an external antenna.

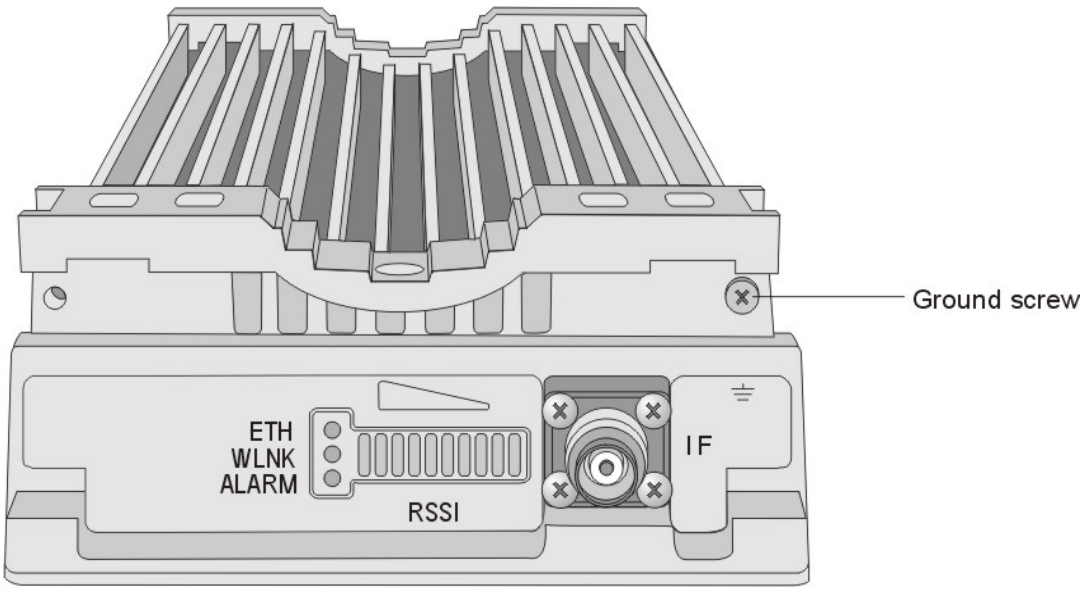

Figure 1-1: SU-RA/RE Bottom Panel

Table 1-3: SU-RA/RE LEDs

LED	Description	Functionality
ETH	Ethernet activity	Blinking – Data received from or transmitted to Ethernet LAN Off – No activity on the Ethernet LAN
WLNK	Wireless link activity	Blinking – Receiving packet from the wireless link Off – No reception of packets from the wireless link
ALARM	Alarm indication	On – A problem with the power amplifier or in the locking process of any of the synthesizers Off – Normal operation

Table 1-4: SU-RA/RE Bar Display Description

LED	Description	Functionality
Yellow LED	Power	On – power is present Off – power is not received from the indoor unit
8 Green LEDs	Received signal strength indication	Received RF signal level indication in 4 dB resolution, starting from –91 dBm
Red LED	High RF signal level	Received signal level is –40 dBm or higher

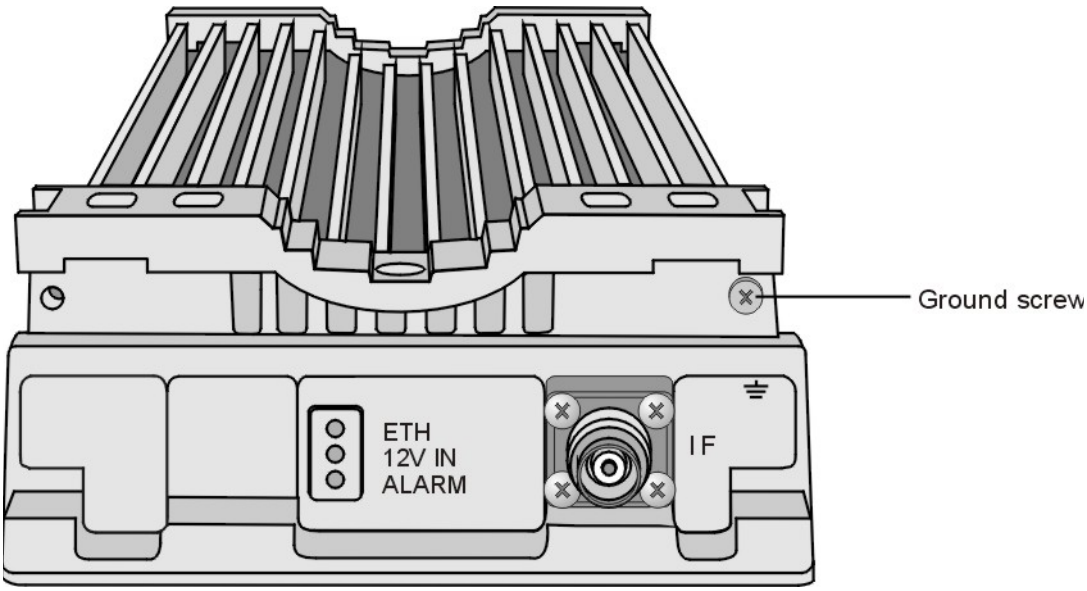

Figure 1-2: AU-RE Bottom Panel

Table 1-5: AU-RE LEDs

LED	Description	Functionality
ETH	Ethernet activity	Blinking – Data received from or transmitted to Ethernet LAN Off – No activity on the Ethernet LAN
12V IN	Power	On – 12 VDC power is supplied to the unit Off – 12 VDC power is not available
ALARM	Alarm indication	On – A problem with the power amplifier or in the locking process of any of the synthesizers Off – Normal operation

Pole Mounting the Outdoor Unit

The outdoor unit can be secured to the pole using one of the following options:

- Special brackets and open-ended bolts (supplied with each unit). There are two pairs of threaded holes on the back of the unit, allowing use of the special brackets with various pole widths.
- Metal bands (9/16" wide, minimum 12" long).

Figure 1-3, page 1-10 shows the locations of the band grooves and threaded holes on the rear side of the outdoor unit.

Figure 1-4, page 1-10 illustrates the method of installing an outdoor unit on a pole, using the brackets and open-ended bolts.

NOTE:

Make sure to install the unit with the bottom panel (the panel with the IF connector) facing downward.

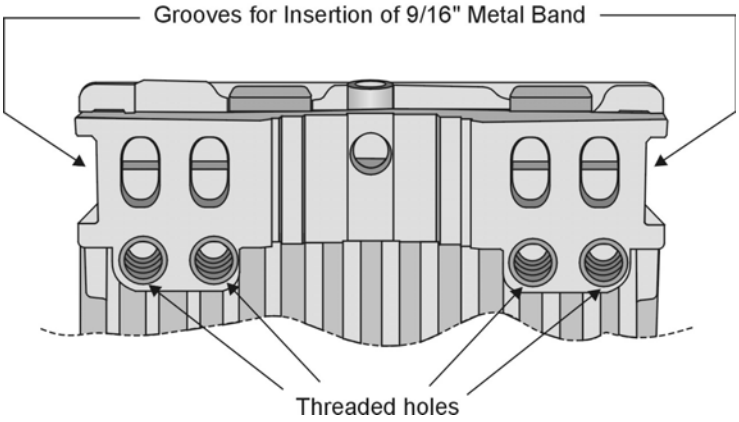

Figure 1-3: Grooves/Threaded Holes

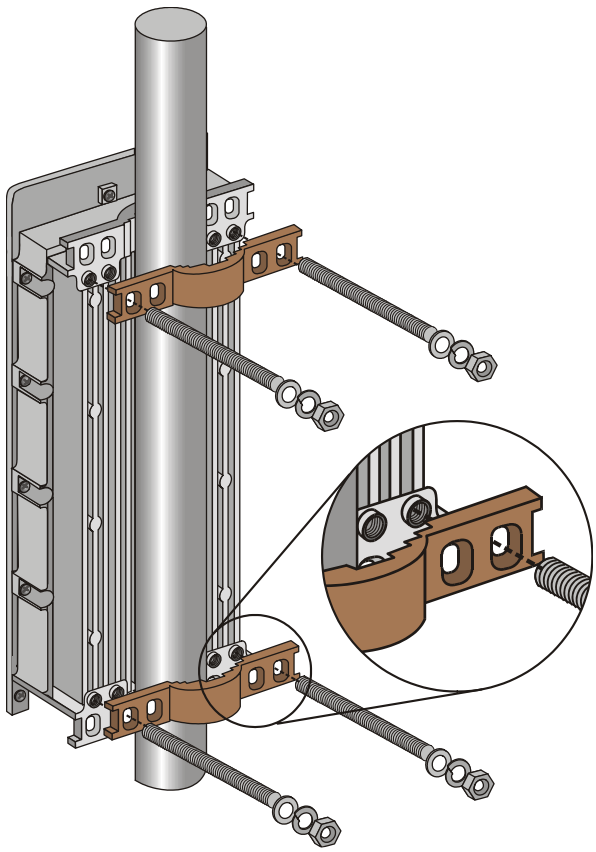

Figure 1-4: 3" Pole Mounting Installation Using the Special Brackets

NOTE:

When inserting the open-ended bolts, make sure to insert them with the grooves pointing outwards; these grooves are intended to allow fastening of the bolts with a screwdriver.

Connecting the Antenna Cable (SU-RE and AU-RE)

Connect an RF cable between the **ANT** connector (located on the top panel of the unit) and the antenna.

Connecting the Ground and IF Cables

The ground terminal (marked ⏚) and the IF cable connector (marked **IF**) are located on the bottom panel of the unit.

1. Connect one end of the ground cable to the ground terminal and tighten the ground screw firmly. Connect the other end of the ground cable to a protective ground connection.
2. Connect the coaxial cable to the IF connector. Verify that the length of the IF cable is sufficient and that it can easily reach the indoor unit.

NOTE:

Make sure to switch off the power at the indoor unit prior to connecting/disconnecting the IF cable to/from the outdoor unit.

Installing the SU-NI and AU-NI Indoor Unit

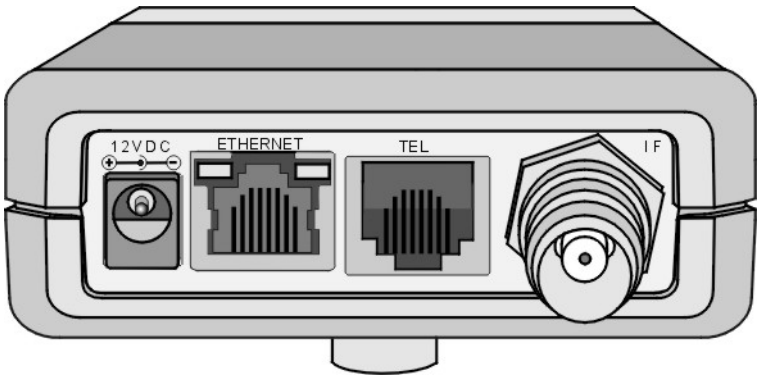

Figure 1-5: SU-NI with Voice Support Rear Panel

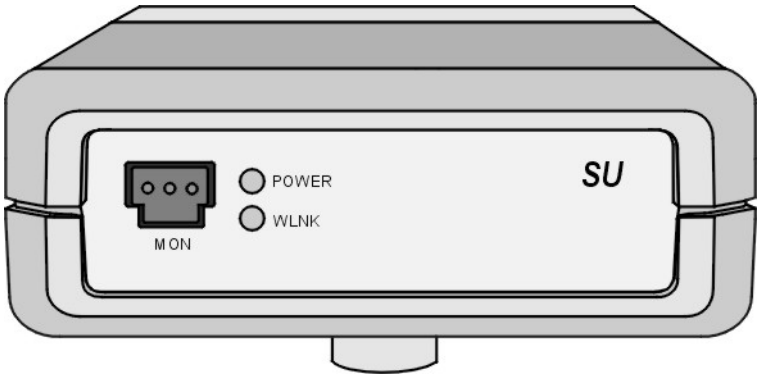

Figure 1-6: SU-NI/AU-NI Front Panel

NOTE:

The rear panel pictured above in Figure 1-5 is a SU-NI with voice support; AU-NI units and SU-NI units that belong to Subscriber Units without voice support are identical, except that they have no TEL port.

Table 1-6: SU-NI/AU-NI LEDs

LED	Description	Functionality
PWR	Power Supply	On – After successful power up, indicating that 12 VDC is supplied to the outdoor unit. Off – Power off or failure to supply 12 VDC to the outdoor unit.
WLNK	Wireless Link Activity	Blinking – Receiving packets from the wireless media Off – No reception of packets from the wireless media

The SU-NI/AU-NI provides the following interfaces:

- An Ethernet connector (marked **ETH**) for connecting the unit to the network. See Table 1-1, page 1-4 for information on the required type of Ethernet cable.
- An IF connector for connecting the unit to an outdoor unit.
- A **DC-12V** connector for the power supply.
- A **MON** connector for connecting an ASCII terminal with terminal emulation software for configuration and maintenance purposes.
- A **TEL** connector (Sunscriber Units with voice support only) for connecting a regular telephone.

Installing the SU-NI/AU-NI Unit

1. Place the unit in an appropriate location on a shelf or a table. The unit can be wall mounted using the installation materials provided with the unit. Use a 6 mm (1/4") drill and the supplied template plate for easy and accurate marking of the holes.
2. Connect the power supply DC power cord to the DC In jack (marked **DC-12V**) located on the rear panel of the unit (shown in Figure 1-5, page 1-12).
3. Connect the IF cable to the IF connector (marked **IF**). The other side of the IF cable should already be connected to the outdoor unit.

NOTE:

In order to avoid inadvertantly transmitting on incorrect frequencies, the basic parameters of the unit should be configured before connecting the antenna.

4. Connect the mains power cord to the power supply unit. Connect the mains power plug to a mains power outlet.
5. Verify that the Power LED (marked **PWR**) located on the front panel of the unit, as shown in Figure 1-6, page 1-12, is lit.

Installing Modular Base Station Equipment

BS-SH Slot Assignments

The base station chassis has ten slots.

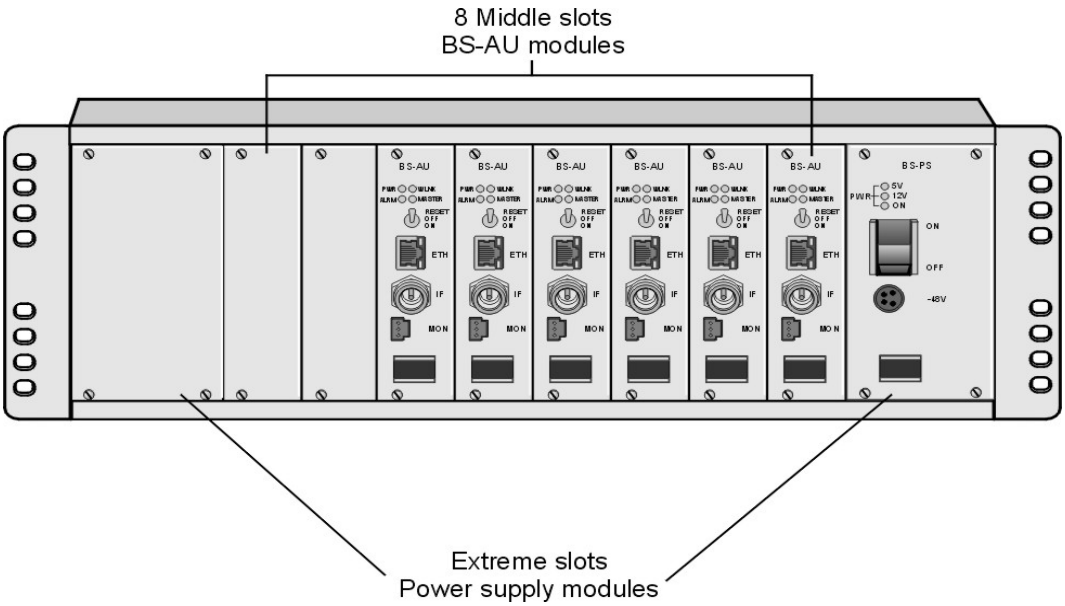

Figure 1-7: BS-SH Chassis Slot Assignments

The two wide slots on both sides of the shelf accommodate the BS-PS or BS-PS-AC power supply modules. The shelf is designed to support power supply redundancy through the use of two power supply modules. If a single power supply is used, it can be inserted in any of the two available slots. When using two power supply modules, both modules must be the same type (either both BS-PS or both BS-PS-AC).

The remaining eight slots can accommodate up to six active BS-AU modules. Two extra slots are for an optional BS-GU GPS module and/or for future use. BS-AU and BS-GU modules can be installed in any of the eight slots. Unused slots should be covered by blank panels.

The BS-PS

The BS-PS provides power to all the modules installed in the BS-SH chassis. The BS-PS front panel is shown in Figure 1-8, page 1-15.

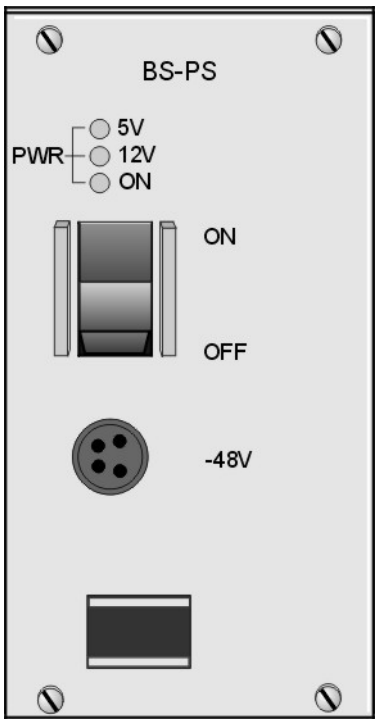

Figure 1-8: BS-PS Front Panel

The BS-PS provides a power input connector (marked **-48V**) for connecting the -48VDC power source to the module. The color codes of the cable wires are:

Black -48 VDC
Red + (Return)

The power switch turns the mains power to the power supply ON and OFF.

Table 1-7: BS-PS LEDs

LED	Description
ON	-48 VDC is available and power supply is on
5V	The 5V power supply module is OK and power is consumed (at least one BS-AU module is inserted)
12V	The 12V power supply module is OK and power is consumed (at least one AU-RA/RE unit is connected)

The BS-PS-AC

The BS-PS-AC is an AC to DC converter that provides power to all the modules installed in the BS-SH chassis. The BS-PS-AC front panel is shown in Figure 1-9, page 1-16.

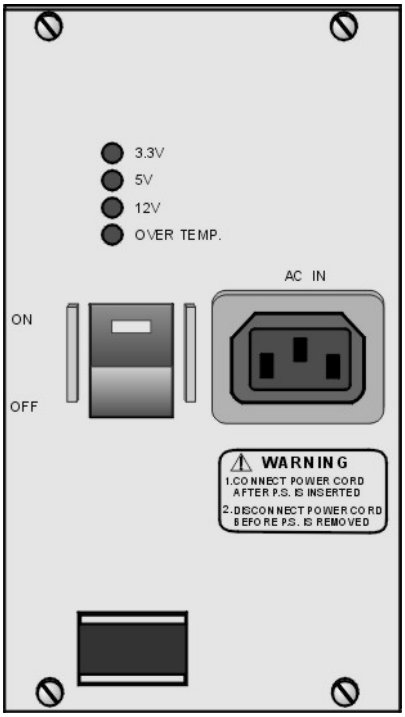

Figure 1-9: BS-PS-AC Front Panel

The BS-PS-AC provides a power input connector (marked **AC IN**) for connecting the AC power cable to the mains.

The **ON/OFF** power switch controls the connection of the mains power to an AC to DC converter.

Table 1-8: BS-PS-AC LEDs

LED	Description
3.3V	Green LED. Indicates that the 3.3V power supply module is OK (3.3V power supply is not used by current BreezeACCESS modules)
5V	Green LED. Indicates that the 5V power supply module is OK
12V	Green LED. Indicates that the 12V power supply module is OK
OVER TEMP	Red LED. Indicates an Over Temperature condition in the power supply module

NOTE:

If the **Over Temp** indication stays on for more than 10 seconds, the power supply module will shut itself offautomatically to prevent damage.

WARNING:

If two power supply modules are used in the same chassis for redundancy, both power supplies must be of the same type. Do not use a mix of AC and DC power supply modules in the same chassis.

The BS-AU

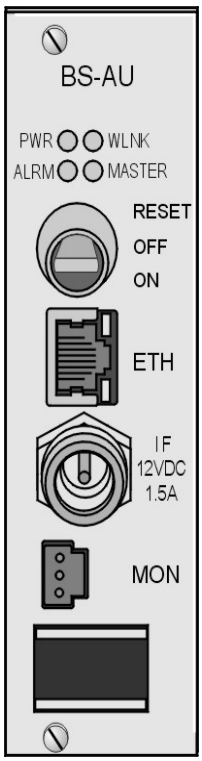

Figure 1-10: BS-AU Front Panel

Table 1-9: BS-AU LEDs

Name	Description	Functionality
PWR	Power supply 12 VDC	On – After successful power up, indicating that 12 VDC is supplied to the outdoor unit. Off – Power off or DC/DC converter failure (12 VDC not supplied to the outdoor unit)
WLNK	Wireless link activity	Blinking – Receiving packets from the wireless media Off – No reception of packets from the wireless media
ALRM	Alarm	On – Loss of hopping synchronization (in Slave mode)
MASTER	Master unit	On – The unit is configured as Master

The BS-AU provides the following interfaces:

- An Ethernet connector (marked **ETH**) for connecting the BS-AU to the network. A straight Ethernet cable should be used to connect the module to a hub, router or switch.
- An IF connector for connecting the BS-AU to an outdoor unit (AU-RE).
- A **MON** connector for connecting an ASCII terminal with terminal emulation software for configuration and maintenance purposes.

The switch on the BS-AU front panel controls the supply of 12 VDC power to the outdoor unit via the IF cable. The momentary **RESET** position of this switch is for resetting the outdoor unit. In the **OFF** position, power is not supplied to the outdoor unit, even when the BS-AU unit is still on.

BS-SH Chassis and Modules Installation Procedure

1. Install the BS-SH chassis in a 19" cabinet (or place on an appropriate shelf/table). When mounting the BS-SH chassis on a desktop, screw on the rubber legs shipped with the unit. To prevent over-heating, leave a free space of at least 1 U between the upper/lower covers of the chassis and other units.
2. Connect a ground cable between the ground terminal (located on the back panel of the BS-SH chassis) and a grounding point (or to the rack when appropriate).
3. Carefully insert the BS-PS or BS-PS-AC Power Supply and the BS-AU modules into their intended slots and push firmly until they are securely locked. Before inserting the modules, verify that the switches of all BS-AU modules are in the OFF position. Close the captive screws attached to each module. Place blank covers over all the unused slots.
4. Connect the IF cable(s) to the connector(s) marked **IF** located on the front panel(s) of the BS-AU module(s) as shown in Figure 1-10, page 1-17. The other side of the IF cable should already be connected to the outdoor unit.

NOTE:

In order to avoid inadvertantly transmitting on incorrect frequencies, the basic parameters of the unit should be configured before connecting the antenna.

5. If a BS-PS DC power supply is used, connect the DC power cable to the –48 VDC In jack (marked **–48V**) located on the front panel of the BS-PS power supply. If a redundant power supply module is installed, connect a power cable to it as well. Connect the power cable(s) to the –48 VDC

power source and the black wire to the
-48 VDC contact of the power source. Connect the red wire to the
+ (Return) contact. Connect the shield to the ground.

6. If a BS-PS-AC AC power supply is used, connect the AC power cable to the AC jack (marked **AC IN**) located on the front panel of the BS-PS-AC power supply. If a redundant power supply module is installed, connect a power cable to that unit as well. Connect the power cable(s) to the AC mains.

7. Switch the BS-PS or BS-PS-AC power supplies to **ON**. Verify that all the power indicator LEDs on the front panel are on. If you are using a BS-PS-AC power supply module, verify that the **OVERTEMP** alarm indicator is off.

8. Configure the basic parameters in all BS-AU modules as described in *Book 3: Commissioning*. Set the switches on the front panel of all BS-AU modules in the chassis to **ON** only after all the basic parameters have been configured properly. This is to avoid transmitting at undesired frequencies.

NOTE:

Disconnect the IF cable from the BS-AU module before inserting or removing it to/from the BS-SH chassis.

Installing the GU-A-BS GPS and Alarms System

BS-GU Front Panel

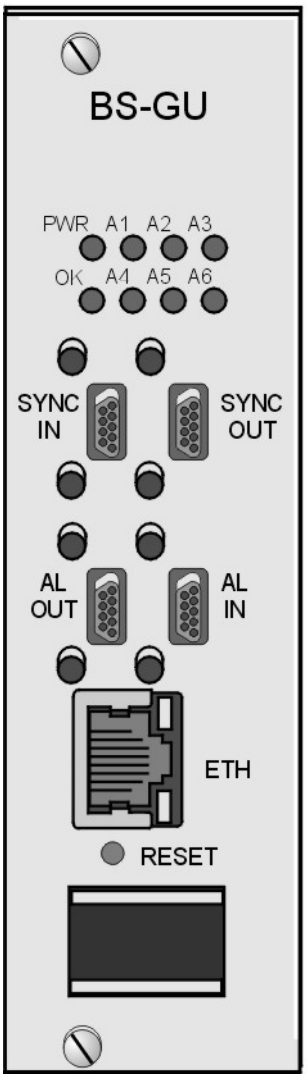

Figure 1-11: BS-GU Front Panel

Table 1-10: BS-GU Connectors

Connector Name	Functionality
SYNC IN	Receives signals from the GPS antenna unit. If more than one collocated BS-GU module is daisy-chained, this connector is used by a "Slave" module to receive signals from the "Master" module's SYNC OUT connector.
SYNC OUT	Transfers the signals received on the SYNC IN port. If the module is a "Master" operating in "local" mode, the internally generated synchronization signals are also transferred to the "Slave" via this connector.S
AL IN	Four connections to receive indications from external devices.
AL OUT	Three relay outputs to external devices.
ETH	Ethernet 10BaseT interface. Use a straight cable to connect directly to a PC. Use a crossed cable to connect to a hub.

Table 1-11: BS-GU LEDs and Switches

LED Name	Functionality
LED Name	Functionality
PWR (green)	On – Power supply functioning properly. Off – Power supply not functioning properly.
OK (green)	On – Proper signals are being received from the GPS antenna. Off – The GPS antenna is not connected or it is not functioning properly.
A1 (red)	On – Alarm In 1 (external) is activated.
A2 (red)	On – Alarm In 2 (external) is activated.
A3 (red)	On – Alarm In 3 (external) is activated.
A4 (red)	On – Alarm In 4 (external) is activated.
A5, A6 (red)	Reserved for future use.
Ethernet Activity -Ethernet Connector embedded LED (green)	On – Receiving traffic on the Ethernet port. Off – No activity on the Ethernet port.
Ethernet Integrity -Ethernet Connector Embedded LED (orange)	On – Unit is connected to an Ethernet segment. Off – Unit is not connected to an Ethernet segment.
Reset	Press this button with a paper clip or similar object in order to reset the unit.

Installing the GU-RA GPS Antenna

1. Screw the GPS antenna firmly to the special 1" threaded pole.
2. Use the mounting kit supplied with the unit (or any other suitable means) to secure the GPS antenna pole to an existing pole (e.g. any pole used for mounting base station antennas or the outdoor units of the BreezeACCESS Access Units). Choose the location to ensure an obstacle-free line of sight from the GPS antenna to the sky, extending at least 30 degrees in all directions.

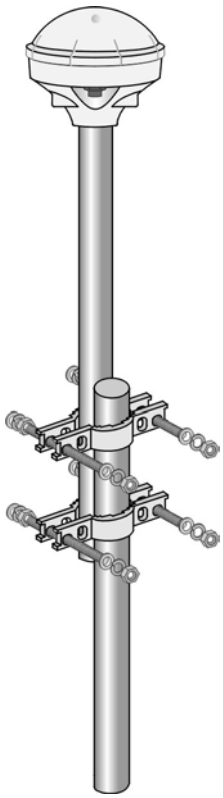

Figure 1-12: GPS Installation

3. Secure the GPS cable to the mounting pole, leaving a free length of cable (with the 12-pin round connector at the end) sufficient for connecting to the antenna module.

WARNING:

The cable is very heavy and connecting it to the antenna without first securing it to the pole may damage the connector.

4. Connect the 12-pin round connector to the GPS antenna.
5. Route the cable to the location intended for installation of the BS-GU module.

NOTE:

Outdoor units and antennas should be installed ONLY by experienced installation professionals who are familiar with local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities.

Failure to do so may void the BreezeACCESS product warranty and may expose the end user or the service provider to legal and financial liabilities. Alvarion and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of outdoor units or antennas.

Installing the BS-GU module

NOTE:

When adding the BS-GU to an active base station, it is recommended to start by reconfiguring the AU previously defined as Master to Slave, then immediately inserting and configuring the ***Number of Hopping Frequencies*** parameter in the BS-GU module. Otherwise both the Master AU and the BS-GU will send conflicting synchronization signals to the Slave AUs. During this process, connectivity with the Subscriber Units will be interrupted. It is recommended to perform the upgrade during a planned downtime or at a time of minimal traffic. Properly configuring the value of the ***Number of Hopping Frequencies*** parameter in the BS-GU is mandatory for proper operation of the base station. All other parameters of the BS-GU module may be configured later as they do not impact the operation of the system.

Inserting the BS-GU Module and Connecting It to the Antenna

1. Carefully insert the BS-GU module into any of the free suitable slots in the BS-SH chassis and push firmly until it is securely locked. Close the captive screws attached to the module.
2. Connect the 9-pin micro D-Type connector of the GPS cable to the **SYNC IN** connector (the top-left connector) of the BS-GU module.

WARNING:

Deactivate the power to the BS-GU unit before connecting it to a GPS antenna. Switch on the BS-GU only after the GPS antenna has been connected.

Daisy-chaining Two or More BS-GU Modules

If two or more BS-GU modules are installed in different collocated BS-SH chassis, use a synchronization cable (supplied separately) to connect the **SYNC OUT** connector of the first (Master) module to the **SYNC IN** connector of the second module. The **SYNC OUT** of this second module may be connected to the **SYNC IN** of a third module, and so on.

BreezeACCESS V

Version 4.3

Revision 4.0

System Manual Book 3: Commissioning

Commissioning

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Chapter 1

Setting Basic Parameters

About This Chapter

This chapter explains how to configure the basic parameters of the BreezeACCESS system and includes the following section:

- **Accessing the Monitor Program, page 1-2**, explains how to accessyour BreezeACCESS units for configuration.
- **Configuring Basic Parameters in Access and Subscriber Units, page 1-5**, outlines the basic configuration process for BreezeACCESS AU and SUs.
- **Configuring Parameters in GU-A-BS Units, page 1-7**, outlines the basic configuration process for BreezeACCESS BS-GU units.

Accessing the Monitor Program

Accessing the Monitor Program using the RS 232 MON Connector

1. Use the monitor cable to connect the **MON** connector of the unit to the COM port of your ASCII ANSI terminal or PC. The COM port connector on the monitor cable is a 9-pin D-type plug.
2. Run a terminal emulation program (such as HyperTerminal™).
3. Set the communication parameters as follows:

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	Xon/Xoff
Connector	Connected COM port

4. Press **Enter**. The *Select Access Level* menu appears. Select the access level according to your authorized access level. You will be requested to enter your password. After entering the correct password, press **Enter**.

Table 1-1, page 1-2 lists the default passwords for each of the access levels.

Table 1-1: Default Passwords

Access Rights	Password
Read Only	public
Installer	user
Administrator	private

NOTE:

Following three unsuccessful login attempts (using incorrect passwords) from either the monitor port or via Telnet, the monitor program will be blocked for five minutes. To access the monitor program during this time, the unit must be reset (via SNMP or by disconnecting/reconnecting power).

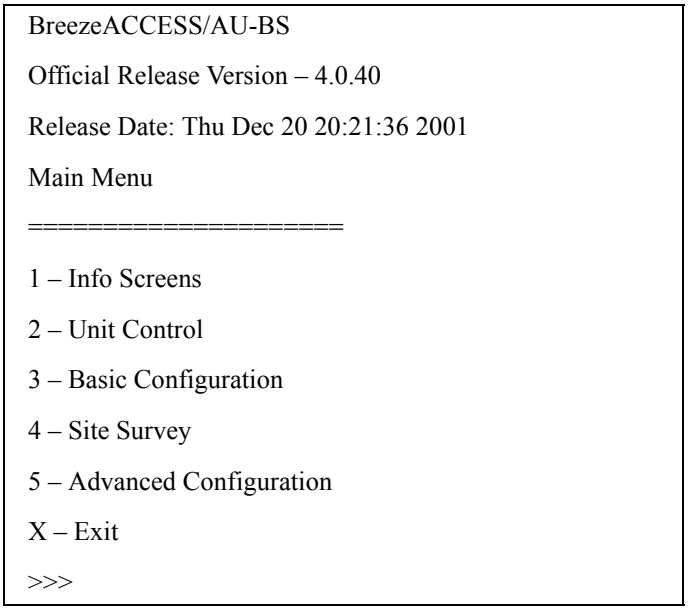


Figure 1-1: Main Menu – Administrator Access Rights (SU and AU)

The appearance of the *Main Menu* varies in accordance with the set access level.

- For users with Read Only access rights, only the *Info Screens* option is displayed. Users with this access level cannot access the *Unit Control*, *Basic Configuration*, *Site Survey* and *Advanced Configuration* menus.
- For users with Installer access rights, the first four menu items (*Info Screens*, *Unit Control*, *Basic Configuration* and *Site Survey)* are displayed. Users with this access level cannot access the *Advanced Configuration* menu.
- For users with Administrator access rights, the full *Main Menu* will be displayed. These users can access all the menu items.

NOTE:

The Main Menu of the BS-GU (GPS and Alarms module) does not include the Basic Configuration option.

Accessing the Monitor Program using Telnet

1. Connect a PC to the Ethernet port of the unit. See the table below to determine the type of cable. Configure the PC's IP parameters to enable connectivity with the unit (the default IP Address is 10.0.0.1). Run the Telnet application.

Table 1-2: Required Type of Ethernet Cable

Unit Type	Connection to a PC	Connection to a Hub
Subscriber Units	Straight	Crossed
Access Units	Crossed	Straight
GPS module	Straight	Crossed

2. The *Select Access Level* menu appears. Select the access level according to your authorized access rights. You will be requested to enter your password. After entering the correct password press **Enter**. Default passwords are listed in Table 1-1, page 1-2.
3. The *Main Menu* appears. Proceed as you would after connecting via the **MON** port.

Operating the Monitor Program

1. Type an option number to open/activate the option. You may need to press **Enter** in some cases.
2. Press **Esc** to exit a menu or option.
3. You can log-out and exit the monitor program from the *Main Menu* by selecting **X** (exit). (To get to the *Main Menu* from anywhere in the program, press the **Esc** key several times). You can also exit the monitor program from anywhere in the program by simultaneously pressing the **Ctrl** and **X** keys.

NOTE:

The program will terminate automatically after a given period of inactivity specified by the ***Log-Out Timer*** parameter.

4. Reset the unit after making configuration changes for the new values to take effect.

Configuring Basic Parameters in Access and Subscriber Units

The *Basic Configuration* menu in the Monitor program includes all the parameters necessary for the initial operation of BreezeACCESS Subscriber and Access Units. In many installations, most of these parameters should not be changed from their default values. The following list includes the basic parameters and their default values:

Table 1-3: Subscriber and Access Units Basic Parameters:

Parameter	Default Value	Comment
IP Address	10.0.0.1	
Subnet Mask	255.0.0.0	
Default Gateway Address	0.0.0.0	
DHCP Option	Disable	
Access to DHCP	AU: From Ethernet Only SU: From Wlan Only	
Hopping Band (5.7 GHz Products only)	ISM US FCC	In some units this parameter cannot be changed for compliance with local regulations
Frequency Offset (5.7 GHz products in ISM US FCC or ISM international mode only)	0	
Flexible Hopping Definition – Add/Remove Frequencies		In 5.7 GHz products, applicable only if Hopping Band is set to “Flexible Hopping Definition”.
Scrambling Mode	Standard Scrambling	
Manual Sequence Definition	None	Applicable only if Scrambling Mode is set to Manual Scrambling
Spanning Factor (AU)	1	Applicable only if Scrambling Mode is set to Enhanced Scrambling
Hopping Shift (AU)	1	

Parameter	Default Value	Comment
Hopping Sync (AU-BS only)	Idle	1. Cannot be changed in BreezeACCESS 5.7 GHz units configured to Hopping Band ISM US FCC. 2. If synchronization without GPS is to be supported, one AU should be configured to Master, all other AUs should be configured to Slave. 3. When GPS is used for synchronization, all AUs should be configured to Slave.
Transmit Power Control	7	
ATPC Option	AU: Disable SU: Enable	
Receive Attenuation Control (SU)	0	
Scanning Mode (SU)	Active	
ESSID	ESSID1	
Operator ESSID Option (AU)	Enable	
Operator ESSID (AU)	ESSID1	
Best AU Support (SU)	Disable	
Preferred AU MAC Address (SU)	00-00-00-00-00-00 (none)	Applicable only when Best AU Support is enabled
VLAN Link Type	Hybrid Link	
VLAN ID – Management	65535	
Authentication Algorithm	Open System	In the SU, can be changed to Shared Key only after configuring the WEP Key and the applicable Default Key ID. In the AU at least one WEP key must be configured.
Default Key ID (SU)	1	
WEP Key 1-4	0000000000 (none)	

Once the basic parameters are configured, the unit must be reset in order to activate the new configuration.

Configuring Parameters in GU-A-BS Units

Introduction

This section describes all the parameters that are necessary for the initial installation and operation of GU-A-BS units. Once the unit is properly installed and operational, other parameters can be configured using the monitor program via Telnet or SNMP management.

NOTE:

The BS-GU does not have an external **MON** port, and therefore must be configured using Telnet.

Since all the parameters needed are found in the *Advanced Configuration* menu, **Administrator** level access is required in order to configure a GU-A-BS unit.

Refer to *Book 4: Operation and Administration* for detailed information on the applicable parameters.

In many installations, most of these parameters should not be changed from their default values. The following list includes the basic parameters and their default values:

Table 1-6: GU-A-BS Units Basic Parameters

Parameter	Default Value	Comment
IP Address	10.0.0.1	
Subnet Mask	255.0.0.0	
Default Gateway Address	0.0.0.0	
DHCP Option	Disable	
Number of Hopping Frequencies		According to the Number of Hopping Frequencies in the AUs
Automatic Recovery Option	Disable	Not Applicable to “slave” modules.
VLAN ID – Management	65535	

Once the basic parameters are configured, the unit must be reset in order to activate the new configuration.

Chapter 2

Optimizing the Wireless Link

About This Chapter

This chapter explains how to optimize the performance of the wireless link of BreezeACCESS Subscriber Units and includes the following sections:

- **Configuring the Maximum Data Rate (Subscriber Units), page 2-2**, explains how to read the RSSI measurement and to configure the optimum value for the Maximum Data Rate parameter.
- **Aligning the Antenna of the SU-A/E Subscriber Unit, page 2-3**, gives tips and instructions for aligning the antenna of the SU-A/E for optimum performance.

Configuring the Maximum Data Rate (Subscriber Units)

The BreezeACCESS units transmit at data rates of 3 Mbps, 2 Mbps and 1Mbps. If the quality of the link is not sufficient, it is recommended to decrease the value of the Maximum Data Rate. Note that the higher the data rate, the higher the error rate.

Before reaching a decision on the optimum value for the Maximum Data rate for a specific SU, it is recommended to acquire the RSSI results from the AU. These indicate the level at which the AU receives transmissions from the specific SU (uplink RSSI).

The per SU uplink RSSI can be viewed at the AU as follows:

1. From the *Main Menu*, select ***Site Survey***.
2. In the *MAC Address Database* submenu, select the ***Display Association Info*** option.

If the installer cannot access the AU (e.g. using Telnet) and cannot obtain the measurements from the system administrator, the link quality can be estimated based on the RSSI measurement in the SU as follows:

1. From the *Main Menu*, select ***Site Survey***.
2. Select the ***Continuous Link Quality Display*** option.

   Using the assumption that the link is more or less symmetrical, this value is a good indication to the level at which the SU is received by the AU.

Once the RSSI results have been obtained, proceed as follows:

1. If the measured RSSI is less than a certain threshold, it is recommended to decrease the Maximum Data Rate of the SU in accordance with the following table (including a 3 dB safety margin above the applicable sensitivity thrshold).

Table 2-1: Maximum Data Rates and RSSI

Maximum Data Rate	3 Mbps	2 Mbps	1 Mbps
BreezeACCESS 5.7 GHz	RSSI>-67dBm	-75dBm<RSSI<-67dBm	RSSI<-75dBm
BreezeACCESS 5.2 GHz	RSSI>-73 dBm	-81 dBm<RSSI<-73 dBm	RSSI<-81 dBm

2. Reset the unit for the new configuration to become effective.

Aligning the Antenna of the SU-A/E Subscriber Unit

NOTE:

Antenna alignment using the RSSI bar display is possible only after the Access Unit you wish to associate with is operational and the basic parameters in the Subscriber Unit were properly configured. Otherwise, the unit will not be able to synchronize and associate with the Access Unit. As the RSSI measurement is performed on received frames, its results are meaningless as long as the unit is not associated with an Access Unit.

1. Verify that the outdoor unit's Power indication is on.
2. Align the antenna (integrated into the front side of the SU-RA outdoor unit or separate if the unit is an SU-RE) to point in the general direction of the base station.
3. The RSSI bar display is located on the bottom panel of the outdoor unit. The eight green RSSI LEDs are used for reading the Received Signal Strength Indication. The higher the number of green LEDs that are on, the higher the level of the received signal. Rotate the antenna left and/or right until you reach the maximum RSSI reading (as many green bars lit as possible). Make sure that at all times the front of the antenna faces the general direction of the base station.
4. For proper operation, for 5.2 GHz units, at least two green LEDs must be on. For 5.7 GHz units, at least three LEDs must be on. If you cannot reach a point where at least the minimum required number of green LEDs are on, try to improve the reception quality by placing the antenna at a higher point or in a different location.

NOTE:

As the RSSI bar indicator is not accurate, it is recommended to use the Continuous Link Quality Display test for more precise alignment of the antenna.

5. Firmly secure the unit (SU-RA) or the antenna to the pole.

NOTE:

In some cases (e.g., when the Subscriber Unit is very close to the Base Station), the antenna may have to be installed at an appropriate angle, in order to ensure that it is directed towards the base station antenna.

Chapter 3

BS-GU Connectors

About This Chapter

This chapter explains how to connect external devices to the AL IN and AL OUT connectors of the BS-GU module. It also includes a description of the cable connecting the BS-GU to the GPS antenna and of the SYNC IN/SYNC OUT connectors' pin assignments.

Connecting External Devices to the BS-GU AL IN and/or AL OUT Connectors

Open-ended cables are available from the company for connecting to the module external alarm inputs through the AL IN connector and/or activating external devices through the AL OUT connector. See the tables that follow for descriptions of the connectors' pins functionality. For details on defining and using the alarm inputs and output, refer to *Book 4: Operation and Administration*.

WARNING:

The load of the Alarm Out (AL OUT) connector should not exceed 24 V@1 A max.

Alarms In Cable

Table 3-1: Alarms In Cable

9-pin Micro D-Type AL IN Connector	Description	Color Code
1	Alarm Input 1	Brown
2	Alarm Input 2	White
3	Alarm Input 3	Green
4	Alarm Input 4	Red
5	Not Connected	Black
6	GND	Purple
7	GND	Yellow
8	GND	Orange
9	GND	Blue

NOTE:

The other side of the cable is supplied open-ended.

Alarms Out Cable

Table 3-2: Alarms Out Cable

9-pin Micro D-Type AL OUT Connector	Description	Color Code
1	Relay 1 Common	Brown
2	Relay 1 Normally Closed	White
3	Relay 2 Common	Green
4	Relay 3 Common	Red
5	Relay 3 Normally Closed	Black
6	Relay 1 Normally Open	Purple
7	Relay 2 Normally Closed	Yellow
8	Relay 2 Normally Open	Orange
9	Relay 3 Normally Open	Blue

NOTE:

The other side of the cable is supplied open-ended. The cable shield is connected to the body of the connector.

GPS Cable

Cable Type: EIA RS-422 3X2X25AWG +1X2X24 AWG FTP Shielded cable.

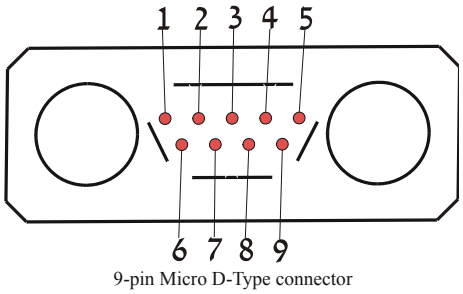
Table 3-3: GPS Cable

9-pin Micro D-Type SYNC IN Connector	Description*	Color Code	12-pin Round Connector
1	GPS TX+	Yellow	5
2	GPS TX-	Green	4
3	GPS RX+	Red	3
4	GPS RX-	Orange	2
5	1PPS+	Brown	11
6	1PPS-	Black	12
7	DC GPS+	Blue (thick)	1
8	DC GPS-	Brown (thick)	9
9	Not connected	----	6,7,8,10

NOTE:

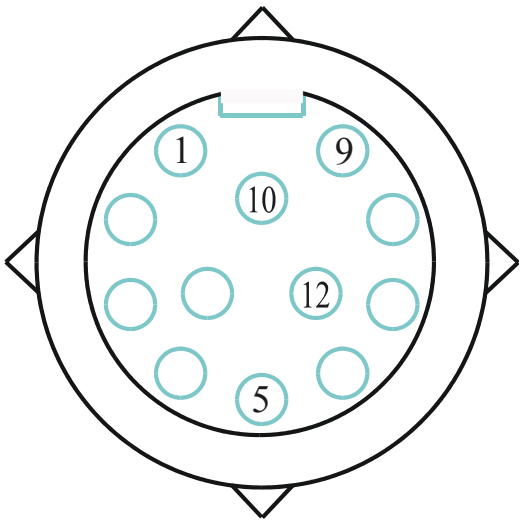
*Descriptions are with respect to the BS-GU SYNC IN connector side.

Figure 3-1 shows a 9-pin Micro D-Type Connector (cable side), and Figure 3-2 shows a 12-pin round connector.



9-pin Micro D-Type connector

Figure 3-1: 9-pin Micro D-Type Connector (cable side)



12-pin round connector

Figure 3-2: 12-pin Round Connector

SYNC Cable

Cable Type: EIA RS-422 3X2X25AWG +1X2X24 AWG FTP Shielded cable.

Table 3-4: SYNC Cable

9-pin Micro D-Type SYNC OUT Connector	Description	Color Code	9-pin Micro D-Type SYNC-IN Connector
1	GPS TX+/SYNC D+	Black	1
2	GPS TX-/SYNC D-	Brown	2
5	1PPS+/SYNC S+	Red	5
6	1PPS-/SYNC S-	Orange	6
8	DC GPS	Green	8
9	Slave	Yellow	9
3,4,7	Not connected		3,4,7

NOTE:

* Descriptions are with respect to the SYNC OUT connector side.

The SYNC cables shield is connected to the body of the micro D-Type connectors.

Chapter 4

Verifying Proper Operation

About This Chapter

This chapter explains how to confirm that the BreezeACCESS system is functioning properly and includes the following sections:

- **Verifying Connectivity , page 4-2** , explains how to ensure that your BreezeACCESS and the equipment connected to them are operating properly.
- **LED Indicators , page 4-4** , lists the LEDs found on BreezeACCESS units and their meanings.

Verifying Connectivity

Verifying the Ethernet Connection

Once you have connected the unit to an Ethernet outlet, verify that the **Ethernet Integrity** indicator (the yellow LED embedded in the Ethernet connector) is on, indicating that the unit is connected to an Ethernet segment. The **Ethernet Activity** indicator (the green embedded LED) should blink whenever the unit receives or transmits traffic on the Ethernet port.

Verifying Data Connectivity (Subscriber Unit)

From a user's PC or from a portable PC connected to the unit, ping the Access Unit or try to connect to the Internet.

Verifying Telephone Connectivity (Subscriber Units with Voice support)

To verify correct operation of the telephone, a test telephone with the default telephony parameters and a known IP address should be connected to the system (the location of the test telephone is determined by the system administrator).

Perform the following steps to verify telephone connectivity:

1. Use IP dialing to call the test telephone: dial * followed by the 12-digit IP address of the test telephone. Verify connectivity. During the conversation, verify that the other party has your IP address.
2. After terminating the call, the other party should use the test telephone to call your IP address and verify that the telephone, including the ringing circuits, functions properly.

Verifying Proper Operation of the GU-A-BS GPS Unit

NOTE:

It may take up to 10 minutes from the time the GU-RA GPS antenna is powered up until it is fully synchronized with the GPS satellite system.

When the unit is operating properly, the **PWR** and **OK** green LEDS should be on, indicating that the BS-GU module is supplying power to the GU-RA GPS antenna and that the GPS antenna is functioning properly.

If the **OK** LED is not on, check the functionality of the GPS antenna as follows:

1. From the *Main Menu*, select ***Info Screens***.

   The *Info Screens* menu opens.

2. From the *Info Screen* menu, select ***Show Unit Status*** and view the Unit Status display. You should see one of the following messages:

   - `UTC is available; date..; time..`: This message indicates that the GPS antenna has synchronized with the satellite system and that the BS-GU is functioning properly. The message may include an incorrect time and date, such as a date in 1999: this indicates that the GPS antenna has not yet synchronized with the GPS satellite system.

     –Or–

   - `UTC time is not available`: This message indicates that the BS-GU is not getting timing signals from the GPS antenna. If the antenna is functioning and properly connected to the module, a probable reason might be that the antenna has not yet synchronized with the GPS satellite system.

LED Indicators

To verify correct operation of the units, view the status of the relevant LED indicators:

SU-RA/RE Outdoor Units LEDs

Table 4-1: SU-RA/RE Outdoor Units LEDs

Name	Description	Functionality
ALARM	Alarm indication	On – A problem with the power amplifier or in the locking process of any of the synthesizers Off – Normal operation
WLNK	Wireless link activity	Blinking – Receiving packet from the wireless link Off – No reception of packets from the wireless link
ETH	Ethernet activity	Blinking – Data received from or transmitted to Ethernet LAN Off – No activity on the Ethernet LAN

AU-RE Outdoor Units LEDs

Table 4-2: AU-RE Outdoor Units LEDs

Name	Description	Functionality
ALARM	Alarm indication	On – A problem with the power amplifier or in the locking process of any of the synthesizers Off –Normal operation
12V IN	12 VDC Power Indication	On – 12 VDC power is supplied to the unit Off – 12 VDC power is not available
ETH	Ethernet activity	Blinking – Data received from or transmitted to Ethernet LAN Off – No activity on the Ethernet LAN

SU-NI and AU-NI Indoor Units LEDs

Table 4-3: SU-NI and AU-NI Indoor Units LEDs

Name	Description	Functionality
PWR	Power supply	On – After successful power up, indicating that 12 VDC is supplied to the outdoor unit. Off – Power off or DC/DC converter failure (12 VDC not supplied to the outdoor unit)
WLNK	Wireless link activity	Blinking – Receiving packets from the wireless media Off – No reception of packets from the wireless media

BS-PS DC Power Supply Module LEDs

Table 4-4: BS-PS DC Power Supply Module LEDs

Name	Description
ON	-48 VDC is available and Power Supply is ON
5V	The 5V power supply module is OK and power is consumed (at least one BS-AU module is inserted)
12V	The 12V power supply module is OK and power is consumed (at least one AU-RA/RE unit is connected)

BS-PS-AC AC Power Supply Module LEDs

Table 4-5: BS-PS-AC AC Power Supply Module LEDs

Name	Description
3.3V	Green LED. Indicates that the 3.3 V power supply module is OK (3.3V power supply is not used by current BreezeACCESS modules)
5V	Green LED. Indicates that the 5 V power supply module is OK
12V	Green LED. Indicates that the 12 V power supply module is OK
OVERTEMP	Red LED. Indicates an Over Temperature condition in the power supply module

BS-AU LEDs

Table 4-6: BS-AU LEDs

Name	Description	Functionality
PWR	Power supply 12 VDC	On – After successful power up, indicating that 12 VDC is supplied to the outdoor unit. Off – Power off or DC/DC converter failure (12 VDC not supplied to the outdoor unit)
WLNK	Wireless link activity	Blinking – Receiving packets from the wireless media Off – No reception of packets from the wireless media
ALRM	Alarm	On – Loss of hopping synchronization (in Slave mode)
MASTER	Master unit	On – The unit is configured as Master

BS-GU LEDs

Table 4-7: BS-GU LEDs

LED Name	Functionality
PWR (green)	On – Power supply functioning properly. Off – Power supply not functioning properly.
OK (green)	On – Proper signals are being received from the GPS antenna. Off – The GPS antenna is not connected or it is not functioning properly.
A1 (red)	On – Alarm In 1 (external) is activated.
A2 (red)	On – Alarm In 2 (external) is activated.
A3 (red)	On – Alarm In 3 (external) is activated.
A4 (red)	On – Alarm In 4 (external) is activated.
A5, A6 (red)	Reserved for future use.

BreezeACCESS V

Version 4.3

Revision 4.0

System Manual Book 4: Operations and Administration

Operations and Administration

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Chapter 1

Accessing the Monitor Program

About This Chapter

This chapter explains how to access the monitor program. It also describes how to use the monitor program to set up, configure, and manage BreezeACCESS Broadband Wireless Access system units. This includes the Subscriber Units (SUs), Access Units (AUs) and GPS and Alarms modules (GUs).

Accessing the Monitor Program using the RS 232 MON Connector

1. Use the monitor cable to connect the MON connector of the unit to the COM port of your ASCII ANSI terminal or PC. The COM port connector on the monitor cable is a 9-pin D-type plug.

NOTE:

The GU-BS GPS and Alarms module does not have an external MON port. It does have an internal MON port that can be used in laboratory conditions (consult Alvarion technical support for further details). It is recommended to use Telnet to access the monitor program of the GU-BS.

2. Run a terminal emulation program (such as HyperTerminal™).
3. Set the communication parameters to the following:

Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	Xon/Xoff
Connector	Connected COM port

4. Press **Enter**. The *Select Access Level* menu appears. Select the access level according to your authorized access level. You will be requested to enter your password. After entering the correct password, press **Enter**.

Table 1-1, page 1-2 lists the default passwords for each of the access levels.

Table 1-1: Default Passwords

Access Rights	Password
Read Only	public
Installer	user
Administrator	private

NOTE:

Following three unsuccessful login attempts (using incorrect passwords) from either the monitor port or via Telnet, the monitor program will be blocked for five minutes. To enable access to the monitor program during that time, the unit must be reset (via SNMP or by disconnecting/reconnecting power).

Accessing the Monitor Program using Telnet

1. Connect a PC to the Ethernet port of the unit. See the table below to determine the type of cable. Configure the PC's IP parameters to enable connectivity with the unit (the default IP Address is **10.0.0.1**). Run the Telnet application.

Table 1-2: Required Type of Ethernet Cable

Unit Type	Connection to a PC	Connection to a Hub
Subscriber Units	Straight	Crossed
Access Units	Crossed	Straight
GPS module	Straight	Crossed

2. The *Select Access Level* menu appears. Select the access level according to your authorized access level. You will be requested to enter your password. After entering the correct password press **Enter**.

The *Main Menu* appears.

```
BreezeACCESS/AU-BS

Official Release Version – 4.0.40

Release Date: Thu Dec 20 20:21:36 2001

Main Menu

====================
1 – Info Screens

2 – Unit Control

3 – Basic Configuration

4 – Site Survey

5 – Advanced Configuration

X - Exit

>>>
```

Figure 1-1: Main Menu – Administrator Access Rights (SU and AU)

- The appearance of the *Main Menu* varies in accordance with the set access level.For users with **Read Only** access rights, only the *Info Screens* option is displayed. Users with this access level cannot access the *Unit Control*, *Basic Configuration*, *Site Survey* and *Advanced Configuration* menus.

- For users with **Installer** access rights, the first four menu items (*Info Screens*, *Unit Control*, *Basic Configuration* and *Site Survey)* are displayed. Users with this access level cannot access the *Advanced Configuration* menu.
- For users with **Administrator** access rights, the full *Main Menu* will be displayed. These users can access all the menu items.

NOTE:

The *Main Menu* of the GU-BS (GPS and Alarms module) does not include the **Basic Configuration** option.

Operating the Monitor Program

1. Type an option number to open/activate the option. You may need to press **Enter** in some cases.
2. Press **Esc** to exit a menu or option.
3. You can log-out and exit the monitor program from the *Main Menu* by selecting **X** (exit). To get to the *Main Menu* from anywhere in the program, press the **Esc** key several times. You can also exit the monitor from anywhere in the program by simultaneously pressing the **Ctrl** and **X** keys.

NOTE:

The program will terminate automatically after a given period of inactivity specified by the Log-Out Timer parameter.

4. Reset the unit after making configuration changes for the new values to take effect.

NOTE:

Most parameters take effect only after the unit is reset. However, some parameters take effect immediately (run-time configurable). Appendix D includes information on all parameters, including which are run-time configurable.

Chapter 2

Menus and Parameters

About This Chapter

This chapter describes the BreezeACCESS configuration menus and parameters. It includes the following sections:

- **Main Menu, page 2-2**.
- **Info Screens Menu, page 2-3**.
- **Unit Control Menu, page 2-6**.
- **Basic Configuration Menu, page 2-13**.
- **Site Survey Menu, page 2-15**.
- **Advanced Configuration Menu, page 2-36**.

Main Menu

From the *Main Menu* you can access the following menus, depending on your access level:

- **Info Screens** – Provides read-only display of current parameter values. Available at all access levels.
- **Unit Control** – Enables access to general operations such as resetting the unit, loading the default parameters, changing passwords and switching between software versions. Available at the **Installer** and **Administrator** access levels.
- **Basic Configuration –** Enables access to the set of parameters that should be configured as a part of the installation process. These parameters are also accessible from the *Advanced Configuration* menu. Available at the **Installer** and **Administrator** access levels in SU and AU (does not exist in GU).
- **Site Survey –** Enables activation of certain tests and viewing of various system counters. Available at the **Installer** and **Administrator** access levels.
- **Advanced Configuration –** Enables access to all system parameters, including the parameters that are included in the *Basic Configuration* menu. Available only at the **Administrator** access level.
- **Exit –** Enables log-out and exit from the monitor program. Available at all access levels.

Info Screens Menu

```
BreezeACCESS/AU-BS
Official Release Version – 4.0.40
Release Date: Thu Dec 20 21:05:08 2001
Info Screens
====================
1 – Show Unit Status
2 – Show Basic Parameters
3 – Show Advanced Parameters
S – Show All Parameters
>>>
```

Figure 2-1: Info Screens Menu

The *Info Screens* menu enables viewing of the current values of various parameter sets. The parameter sets are identical to the main parameter groups in the configuration menus. The user can view a specific parameter set or can elect to view all parameters (**S**). This menu is available for all access levels.

Show Unit Status

The *Show Unit Status* menu displays the current values of the following parameters:

- **Unit Type –** Identifies the unit's function as one of the following: **Access Unit**, **Subscriber Unit** or **GPS and Alarms Module**.
- **Unit MAC Address –** Displays the unit's unique IEEE MAC address.
- **Unit Hardware Version –** Displays the hardware version of the unit (the indoor module of IF based products).
- **Flash Type –** Displays the type and size of the Flash memory.
- **Flash Versions**
  - **Current Version –** Displays the software version that is currently active.
  - **Shadow Version –** Displays the software version currently defined as the shadow (backup) version.
  - **Version After Reset –** Displays the software version that will be used after the next reset.

- **Console Speed –** Displays the speed defined in the unit for the connected terminal, used for running the terminal emulation program.
- **Number of Associations Since Last Reset –** For SUs - displays the total number of associations with any AU since the last reset, including duplicate associations with the same AU.

  For AUs - displays the number of SUs that have associated with the AU since the last reset, including duplicate associations with the same SU.

The following parameters appear for **Subscriber Units** only:

- **Voice Hardware Version** (SU with voice support only) – Displays the hardware version of the voice module.
- **Unit Status –** Displays the current status of the SU. There are two possible values:

  ❖**SCANNING** – The SU is searching for an AU with which to associate.

  ❖**ASSOCIATED** – The SU is associated with an AU.
- **AU MAC Address** – Displays the MAC address of the AU with which the unit is currently associated. If the unit is not associated with any AU, the address will be that of the IEEE broadcast address: FF-FF-FF-FF-FF-FF.

The following parameter appears for **Access Units** only:

- **Current Number of Associations –** Displays the total number of SUs associated with this AU. This number may include units that are not currently active, as there is no aging algorithm for associated SUs.

NOTE:

An SU will be removed from the list of associated SUs only upon occurrence of any of the following: (1) The AU received from another AU a SNAP frame with the SU MAC address indicating that the SU has become associated with the other AU, or (2) The AU has decided that the SU aged out following its failure to acknowledge a certain number of consecutive frames transmitted to it.

The following parameter appears for **GPS Modules** only:

- **Unit Status** – Indicates the status of the GPS antenna. Either one of the following messages may be displayed:
  - `UTC is available; date..; time..`: This message indicates that the GPS antenna has synchronized with the satellite system and that the BS-GU is functioning properly. The message may include an incorrect time and date, such as a date in 1999. This indicates that the GPS antenna has not yet synchronized with the GPS satellites system.

    –Or–
  - `UTC time is not available`: This message indicates that the BS-GU is not getting timing signals from the GPS antenna. If the antenna is functioning and properly connected to the module, this may be because the antenna has not yet synchronized with the GPS satellite system.

Show Basic Parameters

The *Show Basic Parameters* menu displays the current values of the parameters included in the *Basic Configuration* menu (see Basic Configuration Menu, page 2-13). When using **Read-Only** access rights the ***ESSID*** parameters (ESSID, Operator ESSID, Run Time ESSID and Neighboring AU ESSID) and ***WEP Keys*** are not displayed. The display includes some additional useful read-only information such as the ***Number of Hopping Frequencies*** in SU and AU.

Show Advanced Parameters

The *Show Advanced Parameters* menu enables access sub-menus that display the current values of the parameters included in the applicable sub-menus of the *Advanced Configuration* menu (see Advanced Configuration Menu, page 2-36). When using **Read-Only** access rights the ***ESSID*** parameters (ESSID, Operator ESSID, Run Time ESSID and Neighboring AU ESSID in *Air Interface Parameters*), ***WEP Keys*** (*Security Parameters*) and ***User Password*** and ***Shared Secret*** (*RADIUS Parameters*) are not displayed. The display includes some additional read-only information such as ***Number of Hopping Frequencies*** (*Air Interface Parameters*).

Show All Parameters

The *Show All Parameters* menu displays the current values of all the parameters included in the *Advanced Configuration* menu.When using **Read-Only** access rights the ***ESSID*** parameters (ESSID, Operator ESSID, Run Time ESSID and Neighboring AU ESSID in *Air Interface Parameters*), ***WEP Keys*** (*Security Parameters*) and ***User Password*** and ***Shared Secret*** (*RADIUS Parameters*) are not displayed. The display

includes some additional useful read-only information such as the ***Number of Hopping Frequencies*** (SU and AU).

Unit Control Menu

The *Unit Control* menu includes the following options:

- **Reset Unit** – Resets the BreezeACCESS unit and applies any changes made to the system parameters.
- **Defaults Settings** – Resets the unit to a predefined set of default parameters or to save the current configuration as Operator Defaults. The available options are:
  - **Set Defaults** – Resets the unit to a set of default parameters. The following options are available:
    - **Cancel Request** – Exits to the *Unit Control* menu without any change.
    - **Set Complete Factory Defaults** – Available only with **Administrator** access rights. Resets the unit to the set of Alvarion's standard default values. These are the default values as defined in this manual for each of the parameters. After the next reset all parameters will revert to their Factory Defaults value, except for the parameters that are marked in the "Complete" column of Table 2-1, page 2-7.

NOTE:

Activating ***Set Complete Factory Defaults*** will result in loss of connectivity. If the unit is managed remotely, you may lose the ability to communicate with it.

    - **Set Partial Factory Defaults** – Reverts all parameters to the values of the Factory Defaults configuration after the next reset, except for parameters that are necessary to maintain connectivity and to enable management of the unit and some other sensitive parameters. The exact list of parameters that are not changed depends on the access rights of the user.

      Referring to Table 2-1, page 2-7, the parameters that are not changed after activating ***Set Partial Factory Defaults*** using ***Administrator*** access rights are marked in the "Partial-Admin" Column. The parameters that are not changed after activating ***Set Partial Factory Defaults*** using ***Installer*** access rights are marked in the "Partial-Installer" Column.

Table 2-1: Parameters not changed after Set Complete/Partial Factory Defaults

Parameter	Complete	Partial – Admin	Partial - Installer
Unit Control Parameters			
Passwords	√	√	√
Event Log Policy			√
Auto Configuration Option			√
IP Parameters			
IP Address		√	√
Subnet Mask		√	√
Default Gateway Address		√	√
DHCP Option		√	√
Access to DHCP		√	√
Air Interface Parameters			
ESSID		√	√
Operator ESSID Option		√	√
Operator ESSID		√	√
Best AU Support		√	√
Preferred AU MAC Address		√	√
ACSE Option		√	√
Dwell Time		√	√
Hopping Band (5.7 GHz series)	√	√	√
Hopping Shift		√	√
Hopping Sequence		√	√
Flexible Hopping Definition (defined frequencies)	√	√	√
Scrambling Mode	√	√	√
Manual Sequence	√	√	√
Spanning Factor		√	√
Acknowledge Delay Limit		√	√
MAC Address Black List		√	√
VLAN Parameters			
VLAN Link Type		√	√
VLAN ID – Data		√	√
VLAN ID – Management (or Management & Voice)		√	√
VLAN Forwarding Support		√	√
Forwarding VLAN IDs		√	√

(Continued)

Parameter	Complete	Partial – Admin	Partial - Installer
VLAN Relaying Support		√	√
Relaying VLAN IDs		√	√
VLAN Priority – Data		√	√
VLAN Priority – Management		√	√
VLAN Priority – Voice		√	√
VLAN Priority Threshold		√	√
VLAN Priority Tag		√	√
Security Parameters			
Authentication Algorithm		√	√
Default Key ID		√	√
WEP Key 1 to 4		√	√
Network Management Parameters			
Access To Network Management			√
Network Management Filtering			√
Network Management IP Addresses			√
Send SNMP Traps			√
Per Trap Control (all Send Trap Parameters)			√
SNMP Traps IP destination			√
SNMP Traps Community			√
Ports Control Parameters			
Ethenet Port Control		√	√
Voice Port Control		√	√
RADIUS Parameters			√
RADIUS User Name			√
RADIUS User Password			√
RADIUS Shared Secret			√
Authentication Option			√
RADIUS Server Authentication IP address			√
RADIUS Server Authentication Port			√
Accounting Option			√
RADIUS Server Accounting IP address			√
RADIUS Server Accounting Port			√
Accounting Interval			√

- **Set Complete Operator Defaults** – Available only with Administrator access rights. Set the unit to its' Operator Defaults configuration. After the next reset**,** all parameters will revert to their Operator Defaults values, except for the parameters that are marked in the "Complete" column of Table 2-1, page 2-7. Operator Defaults configuration can be defined by the Administrator (see ***Save Current Configuration As Operator Defaults*** below). It may also be defined at the factory according to customer's definition. The default Operators Defaults configuration is the Factory Defaults configuration.

  The complete Operator Defaults Configuration file can be downloaded/uploaded using TFTP with the SNMP Write community string. The procedure is the same as for downloading/uploading configuration files, except that the extension used for the file name is .cmr.

  Examples (using the default SNMP Write community string):

  To upload the configuration file using DOS based TFTP Client to an SU whose IP address is 206.25.63.65:
  tftp 206.25.63.65 put Suconf private.cmr.

  To download the configuration file from the same unit:
  tftp 206.25.63.65 get private.cmr Suconf

NOTE:

Activating ***Set Complete Operator Defaults*** will result in loss of connectivity. If the unit is managed remotely, you may lose the ability to communicate with it.

- **Set Partial Operator Defaults** – Reverts all parameters to the values of the Operator Defaults configuration after the next reset, except for parameters that are necessary to maintain connectivity and to enable management of the unit and some other sensitive parameters. The exact list of parameters that are not changed depends on the access rights of the user. Referring to Table 2-1, page 2-7, the parameters that are not changed after activating ***Set Partial Operation Defaults*** using Administrator access rights are marked in the "Partial-Admin" Column. The parameters that are not changed after activating ***Set Partial Operator Defaults*** using Installer access rights are marked in the "Partial-Installer" Column.
- **Save Current Configuration As Operator Defaults** – Defines the current configuration of the unit as the Operator Defaults configuration. This option is only available with **Administrator** access rights.

- **Change Unit Name** – Changes the name of the unit, which is also the system name in MIB2. This name is also used as the prompt of the monitor program menus.

  Valid values: A string of up to 32 printable ASCII characters.

- **Change Password** – Changes the password(s). A user with **Installer** access rights can change the passwords for Read Only and Installer levels. A user with **Administrator** access rights can change the passwords of all levels.

  Valid values: A string of up to 8 printable ASCII characters.

  Table 1-1, page 1-2 lists the default passwords for each of the access levels.

NOTE:

The Passwords are not changed upon setting the unit to default values (either Partial or Complete).

- **Flash Memory Control –** Selects the active software version. The following options are available:

  - **Reset and Boot from Shadow Version –** Activates the **Shadow** (backup) software version. The unit resets automatically and loads the shadow firmware.
  - **Use Current Version After Reset** – Defines the current version as the one that will be activated and used after the next reset.

  The flash memory can store two software versions. One version is called **Current** and the other is called **Shadow**. New software versions are loaded as the **Shadow** version. You can select the **Shadow** version as the new active version by selecting ***Reset and Boot from Shadow Version***. However, after the next reset, the **Current** version will be activated again. If you wish to continue using the currently active version after the next reset, select ***Use Current Version After Reset***.

  The parameters configured in the unit are not changed as a result of downloading new software versions (unless the new version includes additional parameters or other changes in the list of parameters). New parameters are loaded with their default values.

- **Console Speed –** Defines the speed at which the unit communicates with the terminal running the terminal emulation program. This parameter must be changed prior to changing the speed of the terminal connected to it.

  The allowed speeds are: 9600, 19200, 38400, 57600 and 115200 baud.

  The default value is **9600** baud.

- **Log Out Timer** – Enters a new Log Out Timer value. If the monitor program is not used for the specified time, the unit will automatically exit the monitor program.

  The allowed range is 1 to 999 minutes.

  The default value is **5** minutes.

- **Event Log Menu** – Controls the event log feature. The event log is an important debugging tool and a flash memory sector is dedicated

for storing it. Events are classified according to their severity level: **Trace** (lowest severity), **Message**, **Warning**, **Error** or **Fatal** (highest severity).

The severity at which events are saved in the Event Log is configurable. Events from the configured severity and higher are saved and may be displayed upon request. Log history can be displayed up to the full number of current active events. In the log an event is defined as active as long as it has not been erased (a maximum of 1000 events may be displayed). The error log may be read using TFTP, with remote file name <*SNMP Read Community*>*.log* (the default SNMP Read Community is **public**).

The *Event Log Menu* includes the following options:

- **Event Log Policy** – Determines the minimal severity level. All events whose severity is equal to or higher than the defined severity are logged.

  Valid values are: **Log All (TRC) Level**, **Message (MSG) Level**, **Warning (WRN) Level**, **Error (ERR) Level**, **Fatal (FTL) Level**, **Log None**.

  The default selection is **Fatal (FTL) Level**.

- **Display Event Log –** Displays how many events are logged and selects the number of events to be displayed (up to 1000). The display of each event includes the event time (elapsed time since last reset), the severity level and a message string. The events are displayed in descending order, with the most recent event displayed first.

- **Erase Event Log** – Clears the event log.

◆ **Auto Configuration Parameters** – A sub-menu that contains the parameters related to using the Auto Configuration mechanism. The Auto Configuration mechanism is intended to simplify the configuration process through automatic loading of a configuration file from a TFTP server. The Auto Configuration process is based on getting from a DHCP server the address of the TFTP server and the name of the configuration file to be loaded. This information is used by the unit to initiate a session with the TFTP server, requesting transfer of the applicable configuration file. Upon completing the process of loading the new configuration file, the unit will reset automatically so that the new configuration will take effect.
The following conditions must be met to enable the use of the Auto Configuration process:

a. The ***DHCP Option*** (see page 2-37) in the unit must be configured to either DHCP Only or Automatic mode to enable communication with the DHCP server.

b. The unit must be able to communicate with the DHCP server, according to the configured option of the ***Access to DHCP*** parameter (see page 2-37).

c. The address of the TFTP server and the proper name of the configuration file must be configured in the DHCP server:

- The Server Address should be specified in the 'sname' field of the DHCP header. The code for this option is 66, and the minimum length is 1. It must include a legal IP address, with a maximum length of 64 characters (maximum length includes spaces. Extra characters will be ignored).
- The Configuration File Name should be specified in the 'file' field of the DHCP header. The code for this option is 67, and the minimum length is 1. The maximum length is 128 characters (maximum length includes spaces. Extra characters will be ignored).

The unit shall initiate a request for a configuration file in the following cases (provided the ***DHCP Option*** is enabled):

a. After power-up reset (HW reset), provided the Auto Configuration Option is enabled.

b. Upon enabling the Auto Configuration Option.

c. Upon a user initiated request.

NOTE:

If the response messages from the DHCP server after the requests for TFTP Server Name and Boot File Name do not include these options, or if invalid values have been received, this DHCP server will not be used for automatic IP parameters assignment.

The Auto Configuration Parameters sub-menu includes the following options:

- **Auto Configuration Option** – To disable or enable the Auto Configuration mechanism.
  The default is **Disable**.
- **Request Auto Configuration** – To initiate an Auto Configuration process.

NOTE:

Upon completion of the Auto Configuration process the unit will reset automatically.

- **Show Auto Configuration Parameters** – Displays the status of the **Auto Configuration Option** and the **Auto Configuration Received Status** (Received/Not Received), indicating whether an Auto Configuration File has been received.

- **SNMP Read ESSID** – This parameter is available only under Administrator access rights. For security reasons, the values of some parameters, including ***ESSID*** and ***Run Time ESSID***, can be viewed (get) using SNMP only with the Write Community string, and are not available with the Read Community string. When this parameter is enabled, it allows viewing (get) the values of ***ESSID*** and ***Run Time ESSID*** with the Read Community string as well.

Basic Configuration Menu

The *Basic Configuration* menu includes all the parameters that are necessary for the initial installation and operation of the unit. Once the unit is properly installed and operational, other parameters can be configured either locally using the monitor program or remotely using Telnet, SNMP management or TFTP for loading to the unit a pre-prepared configuration file.

For more information about the initial configuration of BreezeACCESS units, see *Book 3: Commissioning*.

The *Basic Configuration* menu includes the following submenu parameters:

IP Parameters

- IP Address (see page 2-36)
- Subnet Mask (see page 2-36)
- Default Gateway Address (see page 2-36)
- DHCP Client (see page 2-37)

Air Interface Parameters

- ESSID (see page 2-53)
- Operator ESSID Parameters (AU) (see page 2-53)
- Hopping Band* (see page 2-38)
- Flexible Hopping Definition* (see page 2-40)
- Hopping Sync (AU-BS) (see page 2-52)
- Hopping Shift (AU-BS) (see page 2-48)
- Transmit Power Control (see page 2-57)
- ATPC Option (see page 2-60)
- Receive Attenuation Control (see page 2-63)
- Best AU Parameters (SU) (see page 2-55)
  - Best AU Support
  - Preferred AU MAC Address
- Maximum Data Rate (SU) (see page 2-60)
- Scanning Mode (SU) (see page 2-64)

*The Hopping Band and Flexible Hopping Definition parameters are not available in units configured in the factory to operate in ISM US FCC hopping standard only (US Option).

VLAN Parameters

- VLAN ID – Management (AU and SU without voice support)

  (see page 2-70)
- VLAN ID – Voice & Management (SU with voice support)
  (see page 2-70)
- VLAN Link Type (see page 2-72)

Security Parameters

- Authentication Algorithm (see page 2-94)
- Default Key ID (see page 2-95)
- WEP Key # 1 (see page 2-95)
- WEP Key # 2 (see page 2-95)
- WEP Key # 3 (see page 2-95)
- WEP Key # 4 (see page 2-95)

NOTE:

All parameters in the *Basic Configuration* menu are also available in the appropriate submenus of the *Advanced Configuration* menu.

Site Survey Menu

The *Site Survey* menu provides various tests and counters for verifying the quality of the wireless link and the proper operation of the unit. These tests can be used to help determine where to position the units for optimal coverage, to align antennas and to assist in troubleshooting.

Traffic Statistics (AU and SU)

The traffic statistics can be used to monitor, interpret and analyze the wired and wireless links performance. The traffic statistics counters display statistics concerning wireless link and Ethernet frames. The menu includes the following options:

- **Display Counters –** Choose this option to display the current value of the Ethernet and Wireless Link Counters.
- **Reset Counters –** Choose this option to reset all the counters.

Ethernet Counters

The unit receives Ethernet frames from its Ethernet port and forwards them to its internal bridge which decides whether the frame should be transmitted to the wireless media. Frames that were discarded by the unit's hardware filter are not counted by the Ethernet counters.

The unit transmits valid data frames that were received from the wireless media to the Ethernet port, as well as some internally generated frames (e.g. responses to management queries and pings that reached the unit from the Ethernet port).

- **Total received frames via Ethernet –** Displays the total number of frames received from the Ethernet port.
- **Transmitted wireless to Ethernet –** Displays the number of frames transmitted by the unit to the Ethernet port. These are usually frames that have been received from the wireless side, but also frames generated by the unit itself.

Wireless Link Counters

The unit transmits data frames received from the Ethernet port, as well as self-generated control and wireless management frames, to the wireless media. After transmission of a unicast frame, the unit waits for an acknowledgement (ACK) message from the receiving unit. Some control and wireless management frames as well as broadcast and multicast frames that are sent to more than one unit are not acknowledged. If an ACK is not received after a predefined time (determined by the ***Acknowledge Delay Limit*** parameter, see page 2-61), the unit will retransmit the frame until it receives an ACK. If an ACK is not received before the number of retransmissions has reached a maximum predefined number (***Number of Retransmissions*** parameter, see page 2-82), it stops retransmitting and drops the frames.

- **Total transmitted frames to wireless –** Displays the number of frames transmitted to the wireless media. The total includes one count for each data or RTP frame (internally generated voice frame) that was transmitted successfully (excluding retransmissions) as well as the number of transmitted control and wireless management frames.

  If the ***ACSE Option*** (see page 2-63) is enabled, then in addition to the total count, there are also separate counters for the total number of data frames, voice (RTP) frames and beacon frames. The voice frames include fax frames. This is true also for Subscriber Units that do not support voice in cells where the ***ACSE Option*** parameter in the AU is enabled. In this case the Voice count should be 0.

- **Total transmitted unicast frames to wireless** - Displays the number of unicast frames successfully transmitted to the wireless media, excluding retransmissions. This count is useful for calculating the rates of retransmissions or dropped frame, since only unicast frames are retransmitted if not acknowledged.

- **Total submitted frames (bridge) –** Displays the total number of data and RTP frames submitted to the bridge for transmission to the wireless media. The count does not include control frames, wireless management frames, and retransmissions.

  In addition to the total count, there are also separate counts for frames according to the priority queue to which they were routed (**Low**, **Mid**, or **High**).

  If the ***ACSE Option*** is enabled, then the **Low**, **Mid** and **High** counts are for data frames only and there is an additional counter for voice (RTP) frames. The voice frames count includes fax frames. This is true also for Subscriber Units that do not support voice in cells where the ***ACSE Option*** in the AU is enabled. In this case the Voice count should be 0.

- **Frames dropped (too many retries) –** Displays the number of dropped frames. The frames that were retransmitted to the extent of the maximum allowed number of retransmissions without being acknowledged.

If the ***ACSE Option*** is enabled, then in addition to the total count, there are also separate counters for total number of data frames and voice (RTP) frames. The voice frames count includes fax frames. This is true also for Subscriber Units that do not support voice in cells where the ***ACSE Option*** in the AU is enabled. In this case the Voice count should be 0.

- **Total retransmitted frames –** Displays the total number of retransmissions of frames (counts all unsuccessful transmissions/retransmissions).

  If the ***ACSE Option*** is enabled, then in addition to the total count, there are also separate counters for total number of Data frames and Voice (RTP) frames. This is true also for Subscriber Units that do not support voice in cells where the ***ACSE Option*** in the AU is enabled. In this case the Voice count should be 0.

- **Total Tx errors –** Displays the number of transmit errors that have occurred. The total number of Tx errors includes transmissions that were not acknowledged properly, transmissions that were aborted and transmissions that were delayed for various reasons (e.g. not enough time until the end of the current dwell period).

  In addition, the following special counters are displayed to indicate the reason for the error:

  - **H/W**: An internal hardware problem in the modem.
  - **ABR**: The transmission was aborted before completion because of internal problems in the DSP.
  - **CSL**: The transmission was cancelled because the modem was busy in receiving data.
  - **ACKTOUT** (Acknowledge Timeout): The frame was not acknowledged within the time defined by the ***Acknowledge Delay Limit*** parameter.
  - **FAIL**: There was an internal timeout in the modem.
  - **ACKCRC**: There was a CRC error in the ACK message.
  - **RTSC**: The RTS was sent but no CTS was received (RTS collision).
  - **EOD** (End of Dwell): There was not enough time left to transmit the message

- **Total received frames from wireless –** Displays the total number of frames that were received from the wireless media. The count includes data, control and wireless management frames, including beacons received from the AU. The count does not include frames that were discarded internally, bad frames and duplicate frames.

- **Total received data frames –** Displays the total number of data frames received from the wireless media, including duplicate frames (see ***Duplicate frames discarded***, below). In addition to the total count, there are also separate counts for data frames according to the receive priority queue to which they were routed (**Low** or **High**).

- **Bad fragments received** – Displays the number of frames received from the wireless media with errors (CRC errors).
- **Duplicate frames discarded –** Displays the number of frames discarded due to receiving multiple copies. If an acknowledge message was not received by the originating unit, the same data frame can be properly received twice (or more). Although duplicate frames are included in all counters that count data frames, only the first copy is forwarded to the Ethernet port.
- **Internally discarded MIR/CIR –** Displays the number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the maximum allowed information rate.

Voice Statistics (SU with Voice Support Only)

The voice statistics counters display information concerning voice and fax traffic, including T.38 redundant fax traffic. The displayed information includes the accumulated numbers since the last reset for transmitted and received RTP frames and bytes.

- **Display Counters –** Displays the current value of the following voice counters.
  - **Voice Frames Transmitted**
  - **Voice Frames Received**
  - **Voice Bytes Transmitted**
  - **Voice Bytes Received**
- **Reset Counters –** Resets the voice counters.

Per Hop Statistics (AU and SU)

The ***Per Hop Statistics*** provide information on performance of the wireless signal at different hopping frequencies. The *Per Hop Statistics* menu includes the following options:

- **Display Counters –** Displays the continuously updated statistics.
- **Reset Counters –** Resets the ***Per Hop Statistics*** counters.

The ***Display Counters*** option displays various statistics for each of the hopping frequencies. In addition, it displays some general wireless link performance statistics.

Hopping Statistics	
Num	The number of the information row, assigned automatically and sequentially by the program.
Freq	The hopping frequency, according to the hopping sequence.
Rx	The accumulated number of frames received at the specified frequency since last reset.
Tx	The accumulated number of frames transmitted successfully at the specified frequency since last reset.
RTx	The accumulated number of frames re-transmitted at the specified frequency since last reset.
avrDBM (avrRSSI)	The average RSSI (Received Signal Strength Indication) in dBm or RSSI units (according to the RSSI Display Option) of all the frames received at the specified frequency since the last reset. If no frames have been received, the avrRSSI is NA (Not Available).

The **Rx**, **Tx** and **RTx** per hop counters accumulate the number of applicable frames since last reset. The counters can also be reset using the ***Reset Counters*** option in either the *Per Hop Statistics* menu or in the *Traffic Counters* menu.

The general rate (Frames per second) statistics is the average rate during the last 64 hops.

The display is continuously updated. Press any key to exit.

Ping Test (AU, SU and GU)

The *Ping Test* menu includes the following options:

- **Destination IP Address –** Displays the IP address of the destination unit for pinging. Allows entering an IP address (4 x 3 digit octets, separated by dots).

  The default IP address is **192.000.000.001**.

- **No. of Pings –** Enter the number of ping attempts per session.

  The allowed range is from 0 to 9999. Select 0 for continuous pinging.

  The default value is **1**.

- **Ping Frame Length –** Enter the ping packet size.

  The allowed range is from 60 to 1472 bytes.

  The default value is **64 bytes**.

- **Ping Frame Timeout –** Enter the ping frame timeout, which is the amount of time (in ms) to wait between ping attempts.

  The allowed range is from 200 to 60000 ms, in increments of 200 milliseconds (200, 400, 600,……60000).

  The default value is **200 ms**.

- **Start Sending –** Starts transmission of ping frames.
- **Stop Sending –** Stops the transmission of ping frames. The test will end automatically once the number of pings that were sent has reached the value specified in the ***No. of Pings*** parameter (described above). The Stop Sending option can be used to end the test before completing the specified number of pings, or if continuous pinging was selected.
- **Show Ping Test Values –** To display the current values of the ping test parameters, the transmission status (sending or not), the number of pings sent, and the number of pings received (acknowledged frames).

Continuous Link Quality Display (Available in SU Only)

This option displays continuously updated entries that include information on the quality of the received signal (Received Signal Strength Indication or RSSI). Press any key to abort the test.

Each line includes the number of Beacon frames that were received since the last measurement (total Rx), the average RSSI in dBm or RSSI units (according to the RSSI Display Option) for these frames (avrDBM/avrRSSI) and the Error rate (number of retransmitted frames in the last 100 transmitted frames).

The Error rate is meaningful only when there is traffic from the SU to the AU. It is recommended to use the ***Ping Test*** (see page 2-19) with a ***Ping Frame Length*** of 1472 bytes.

MAC Address Database (Available in AU Only)

The MAC Address Database displays information on the subscriber units associated with the AU as well as bridging (forwarding) information. The following options are available:

- **Display Bridging & Association Info** – Displays a list of all the Subscriber Units and stations in the Forwarding Database of the AU. For stations behind an SU, the SU's MAC address is also displayed.

  Each MAC address entry is followed by a description, as follows:

  - **Et** (Ethernet): Addresses that have been learned from the Ethernet port.
  - **Vp** (Virtual port): Addresses of the nodes behind an associated SU. For these addresses, the address of the SU is displayed in parenthesis.
  - **St** (Static): An associated SU. These entries also include the SW Version of the SU.

- **Sp** (Special): 5 Addresses that always exist:
  - The MAC address of the AU (appears twice as it is learned from both the Ethernet and the wireless ports)
  - Alvarion's Multicast address (01:20:D6:00:00:01, also twice). The system handles this address as a Broadcast address.
  - The Ethernet Broadcast address (FF-FF-FF-FF-FF-FF)

In addition, a summary table displays information about the Forwarding Database (Bridging Info), the Associated Subscriber Units Database (Association Info) and the Subscriber Units that are currently conducting a voice call (Call Info). For each of these databases, the displayed information includes:

- The current number of entries. The number of entries in the Bridging Info includes the **Et** (Ethernet) and the **Vp** (Virtual ports) entries. The number of entries in the Association Info includes the associated units.

NOTE:

There is no aging algorithm for associated SUs. An SU will be removed from the associations database only upon occurrence of any of the following: (1) The AU received from another AU a SNAP frame with the SU MAC address indicating that the SU has become associated with the other AU, or (2) The AU has decided that the SU aged out following its failure to acknowledge a certain number of consecutive frames transmitted to it.

- The aging time specified for entries in these tables (the defaults are 300 seconds for the Bridge Aging Time, No Aging for the Association Aging Time and 1800 seconds for the Call Info table).
- The maximum allowed number of entries for these tables (1019 for the Bridging Info and as specified by the ***Maximum Number of Associations*** parameter for the Association Info and the Call Info. The default value of the ***Maximum Number of Associations*** is 512).

- **Display Association Info –** Displays details of the associated SUs. Each entry in the list includes the following information:
  - The MAC address of the associated Subscriber Unit
  - The Maximum Data Rate of the SU.
  - The average level of RF signals received from the Subscriber Unit.
  - The wireless status of the SU. There are three options:
    - **Associated**
    - **Authenticated**
    - **Not Authenticated** (a temporary status)

    Refer to Table 2-2 for details on the status of the SU during the various stages of the association process.

- ❖ The SW version of the SU.

Table 2-2: Association Process (Active Scanning)

Message	Direction	Status in AU
SU Scanning*		
Probe Request (including ESSID) - Scanning	SU → AU	-
Probe Response (only if correct ESSID in Probe Request)	AU → SU	-
SU Synchronized		
Authentication Request	SU → AU	Not Authenticated
Challenge Text	AU → SU	Not Authenticated
Challenge Text Encrypted	SU → AU	Not Authenticated
Authentication Successful	AU → SU	Authenticated
SU Authenticated		
Association Request	SU → AU	Authenticated
Association Successful	AU → SU	Associated
ACK	SU → AU	Associated
Data Traffic	SU ↔ AU	Associated

* When passive scanning is used, the Scanning Phase is comprised of searching for a Beacon frame with the correct ESSID.

- ◆ **Display CIR/MIR Info**: Displays details of the CIR/MIR parameters of the associated SUs. Each entry in the list includes the following information:
  - ❖ The MAC address of the associated Subscriber Unit.
  - ❖ The SW version of the SU.
  - ❖ MIR/CIR info for the SU:
    - ◆ CIR Tx (SU to AU)
    - ◆ MIR Tx (SU to AU)
    - ◆ CIR Rx (AU to SU)
    - ◆ MIR Rx (AU to SU)
    - ◆ Max. Delay.

Per-rate Counters (AU and SU)

Resets or displays the per-rate counters. The per-rate counters display the number of frames (excluding retransmissions) transmitted since the last reset at each of the rates (1 Mbps, 2 Mbps, 3 Mbps) and the total number of frames that were retransmitted at each of the rates. In the AU the information is provided for each of the associated SUs, identified by their MAC address. The counters in the AU are reset when there is a new association with an SU (including reassociations).

RSSI Display Option (AU and SU)

In BreezeACCESS units running SW versions 3.X and below, all measurements of received RF signal levels are displayed using arbitrary RSSI units. From version 4.0 onward, the conventional dBm measurement units can be used. However, to support users that prefer to continue using RSSI units, the **RSSI Display** option enables selecting the measurement units to be used for displaying received signal level values.

Available selections: **dBm**, **RSSI**.

Default selection: **RSSI**.

ATPC Counter (AU and SU)

The ATPC Counter display information related to the number of ATPC power-up/power-down messages sent or received by the unit since last reset.

- **Display Counter** – Displays the current value of the ATPC Counter:
  - **ATPC Transmitted Messages** (AU only) – The number of ATPC power-up/power-down messages that were sent by the AU since last reset.
  - **ATPC Received Messages** (SU only) - The number of ATPC power-up/power-down messages that were received by the SU since last reset. This counter is displayed also in units that do not use ATPC, since the AU sends ATPC messages to all SUs, including SUs in which the ATPC Option is disabled.
- **Reset Counter** – Resets the ATPC Counter.

AU Alarms (IF-based AU Only)

The AU Alarms feature enables to identify and alert upon the detection of a potential problem in the outdoor unit of the AU, or another problem that causes significant degradation in the performance of the wireless link.

When the **AU Alarms Option** is enabled, three types of tests are performed: Traffic Statistics tests, Power tests and Associations test. Information is gathered continuously and various calculations used for decision making are performed each test cycle period that is defined by the configurable **Test Cycl**e parameter. Alarms can be generated only after a sufficient time, defined by the configurable **Learning Period** parameter, has elapsed since the last reset (or since the **AU Alarm Option** was enabled).

Traffic Statistics Tests

The AU gathers traffic information that is used to calculate various traffic statistics. The calculated statistics are used for estimating the performance of the wireless link. The following traffic statistics rates are calculated for each test cycle period:

a. **Current Retransmission Rate** - Defined as Nr/(Nt+ Nr), Where:

   Nr - Number of retransmissions during the last test cycle period.

   Nt - Number of successfully transmitted unicast frames during the last test cycle. The minimum value of Nt+ Nr for a meaningful test is 50 (otherwise the result is NA).

b. **Current Dropped Frames Rate** - Defined as Nd/Nt, where Nd is the number of dropped frames during the last test cycle period. Dropped frames are frames that were drooped because they were retransmitted to the extent of the maximum allowed number of retransmissions without being acknowledged. The minimum value of Nt for a meaningful test is 50 (otherwise the result is NA).

c. **Current CRC Error Rate** - Defined as Ncrc/(Nrx+Ncrc), where:

   Ncrc - Number of frames received with a CRC error during the last test cycle period.

   Nrx - Number of successfully received frames during the last test cycle period.

   The minimum value of Nrx+Ncrc for a meaningful test is 50 (otherwise the result is NA).

d. **Current Duplicate Frames Rate** - Defined as Ndup/Nrx, where Ndup is the number of dropped frames during the last test cycle period. The minimum value of Nrx for a meaningful test is 50 (otherwise the result is NA).

In addition, the **Average Rate** is also calculated for each of the above traffic statistics rates, using the formula Ra(t)=[Rc*1 +Ra(t-1)*5]/6, where:

Rc - **Current Rate**

Ra(t) - The new value of the **Average Rate** for the applicable rate.

Ra(t-1) - the previous **Average Rate** of the applicable rate.

For the first test cycle after reset (or after enabling the **AU Alarms Option**), Ra= Rc.

For each traffic statistics type, three values can be configured:

a. **Minor Alarm Threshold** - The threshold for decision on a minor severity alarm for the applicable traffic statistics type.

b. **Major Alarm Threshold** - The threshold for decision on a major severity alarm for the applicable traffic statistics type.

c. **Minimum Minor Alarm Delta** - serves in the minor alarm decision process, as described below.

A minor severity alarm is generated if both of the following conditions are met:

a. The **Current Rate** of the applicable rate exceeds the **Minor Alarm Threshold** for this traffic statistics type.

b. The **Current Rate** is higher than the **Average Rate** by at least the value of the **Minimum Minor Alarm Delta**, indicating a rapid decrease in performance.

A minor severity alarm will also be generated if the **Current Rate** dropped below the applicable **Major Alarm Threshold** but is still higher than the applicable **Minor Alarm Threshold**. (Alarm status changed from major to minor).

A major severity alarm is generated if the **Current Rate** has increased above the **Major Alarm Threshold** for the applicable traffic statistics type.

Power Tests

Each test cycle, the AU transmits a multicast SNAP (Sub Network Access Protocol) polling message to its associated SUs. The SUs must respond to this message within a given time frame. The response message includes the last RSSI level at which the SU receives transmissions from the AU.

Based on the RSSI information responses from the SUs, the AU performs a calculation of the **SU Rx Power Average Delta**, defined as the average difference for all SUs between the last RSSI at the SU and the previous (one before last) RSSI. The average is calculated only for SUs that responded to both of the last two polling message. The average is calculated as: $\Sigma_{\mathbf{n=1\text{-}N}}$ **[SURSSIn(t) - SURSSIn(t-1)]/N**, where:

SURSSIn(t) - The last RSSI value received from responding SU number **n**.

SURSSIn(t-1) - The previous RSSI value received from responding SU number **n**.

N - The number of SUs that responded to both last and previous polling requests.

A **Tx Power Level Decrease** major severity alarm is generated if the decrease in the **SU Rx Power Average Delta** is higher than the value of the configurable **SU Rx Power Decrease Threshold** parameter:

-(**SU Rx Power Average Delta**) > **SU Rx Power Decrease Threshold**.

The alarm is generated only if the number of SUs used in calculating the **SU Rx Power Average Delta** (responded to both of the last two polling messages) is at least 5.

NOTE:

SUs with SW version below 4.3 will respond to the polling message. However, the last RSSI value will not be included in the response message. Therefore, this test is not applicable to cells where all SUs use SW version below 4.3.

The AU also gathers for all responding SUs the RSSI level at which each SU was received by the AU. Based on these measurements, the AU performs a calculation of the **AU Rx Power Average Delta**, defined as the average difference for all responding SUs between the last RSSI at he AU and the previous (one before last) RSSI:

$\Sigma_{\mathbf{n=1\text{-}N}}$ **[AURSSIn(t) - AURSSIn(t-1)]/N**, where:

AURSSIn(t) - The last RSSI value at which the responding SU number **n** was received by the AU.

AURSSIn(t-1) - The previous RSSI value at which the responding SU number **n** was received by the AU.

An **Rx Signal Strength Decrease** major severity alarm is generated if the decrease in the **AU Rx Power Average Delta** is higher than the value of the configurable **AU Rx Power Decrease Threshold** parameter:

-(**AU Rx Power Average Delta**) > **AU Rx Power Decrease Threshold**.

The alarm is generated only if the number of responding SUs used in calculating the **AU Rx Power Average Delta** (responded to both of the last two polling messages) is at least 5.

Association Tests

If the AU was reset 3 times because no SU became associated with it, a **No Associations** critical alarm will be generated, provided that previously the AU was associated with at least **Minimum Number Of SUs**.

An **All Associations Lost** major alarm is generated if no response was received by the AU to the last three polling messages, provided that prior to that, the average number of responding SUs was not lower than the **Minimum Number Of SUs**.

AU Alarms Summary

A prerequisite for all alarms except the **No Associations** alarm, is that the elapsed time since last power-up (or since the **AU Alarms Option** was enabled) is not lower than the **Learning Period**.

The AU Alarms are summarized below.

No Associations Alarm	
Severity:	Critical
On Conditions:	Three consecutive resets due to no response from any SU, and prior to that the AU was associated with at least **Minimum Number Of SUs**.
Off Conditions:	a. At lease one SU became associated with the AU -OR- b. All alarms were cleared, -OR- c. **AU Alarms Option** was disabled
Possible Problem:	Unlocked synthesizer, very low Tx power or another major HW problem.

All Associations Lost Alarm	
Severity:	Major
On Conditions:	No response from any SU to the last 3 polling messages, and prior to that the average number of responding SUs was not lower than the **Minimum Number Of SUs**.
Off Conditions:	a. At lease one SU became associated with the AU -OR- b. All alarms were cleared -OR- c. **AU Alarms Option** was disabled
Possible Problem:	Unlocked synthesizer, very low Tx power or another major HW problem.

Tx Power Level Decrease Alarm (not applicable if SUs use SW version lower than 4.3)	
Severity:	Major
On Conditions:	The inverse (minus) of **SU Rx Power Average Delta** is higher than **SU Rx Power Decrease Threshold**, and the number of SUs that responded to the last two polling messages is at least 5.
Off Conditions:	a. All alarms were cleared -OR- b**. AU Alarms Option** was disabled
Possible Problem:	A transmitter fault resulting in a significant decline of the Tx power level.

Rx Signal Strength Decrease Alarm	
Severity:	Major
On Conditions:	The inverse (minus) of **AU Rx Power Average Delta** is higher than **AU Rx Power Decrease Threshold**, and the number of SUs that responded to the last two polling messages is at least 5.
Off Conditions:	a. All alarms were cleared, -OR- b**. AU Alarms Option** was disabled
Possible Problem:	A receiver fault.

High Retransmissions Rate Alarm

Severity:	Minor, Major
On Conditions:	**Minor Severity Alarm**: a. The Retransmissions **Current Rate** exceeds the Retransmissions **Minor Alarm Threshold**, and is higher than the Retransmissions **Average Rate** by at least Retransmissions **Minor Alarm Minimum Delta**, -OR- b. The Retransmissions **Current Rate** has dropped below the Retransmissions **Major Alarm Threshold** but is still higher than the Retransmissions **Minor Alarm Threshold.** **Major Severity Alarm**: The Retransmissions **Current Rate** is higher than the Retransmissions **Major Alarm Threshold**.
Off Conditions:	a. The Retransmissions **Current Rate** has dropped below the Retransmissions **Minor/Major Alarm Threshold,** -OR- b. All alarms were cleared, -OR- c. **AU Alarms Option** was disabled
Possible Problem:	a. Transmitter or receiver fault b. Poor link conditions, strong interference, or an overloaded network.

High Dropped Frames Rate Alarm

Severity: Minor, Major

On Conditions: **Minor Severity Alarm**:

a. The Dropped Frames **Current Rate** exceeds the Dropped Frames **Minor Alarm Threshold**, and is higher than the Dropped Frames **Average Rate** by at least Dropped Frames **Minor Alarm Minimum Delta**,

-OR-

b. The Dropped Frames **Current Rate** has dropped below the Dropped Frames **Major Alarm Threshold**, but is still higher than the Dropped Frames **Minor Alarm Threshold.**

Major Severity Alarm: The Dropped Frames **Current Rate** is higher than the Dropped Frames **Major Alarm Threshold**.

Off Conditions: a. The Dropped Frames **Current Rate** has dropped below the Dropped Frames **Minor/Major Alarm Threshold,**

-OR-

b. All alarms were cleared

-OR-

c**. AU Alarms Option** was disabled

Possible Problem: a. Transmitter or receiver fault

b. A severe case of poor link conditions, strong interference, or an overloaded network.

High CRC Error Rate Alarm

Severity:	Minor, Major
On Conditions:	**Minor Severity Alarm**: a. The CRC Error **Current Rate** exceeds the CRC Error **Minor Alarm Threshold**, and is higher than the CRC Error **Average Rate** by at least CRC Error **Minor Alarm Minimum Delta**, -OR- b. The CRC Error **Current Rate** has dropped below the CRC Error **Major Alarm Threshold** but is still higher than the CRC Error **Minor Alarm Threshold.** **Major Severity Alarm**: The CRC Error **Current Rate** is higher than the CRC Error **Major Alarm Threshold**.
Off Conditions:	a. The CRC Error **Current Rate** has dropped below the CRC Error **Minor/Major Alarm Threshold,** -OR- b. All alarms were cleared, -OR- c**. AU Alarms Option** was disabled
Possible Problem:	a. Receiver fault b. Strong interference

High Duplicate Frames Rate Alarm	
Severity:	Minor, Major
On Conditions:	**Minor Severity Alarm**: a. The Duplicate Frames **Current Rate** exceeds the Duplicate Frames **Minor Alarm Threshold**, and is higher than the Duplicate Frames **Average Rate** by at least Duplicate Frames **Minor Alarm Minimum Delta**, -OR- b. The Duplicate Frames **Current Rate** has dropped below the Duplicate Frames **Major Alarm Threshold** but is still higher than the Duplicate Frames **Minor Alarm Threshold.** **Major Severity Alarm**: The Duplicate Frames **Current Rate** is higher than the Duplicate Frames **Major Alarm Threshold**.
Off Conditions:	a. The Duplicate Frames **Current Rate** has dropped below the Duplicate Frames **Minor/Major Alarm Threshold,** -OR- b. All alarms were cleared, -OR- c**. AU Alarms Option** was disabled
Possible Problem:	a. Transmitter fault b. Strong interference, preventing the SU from receiving the AU's ACKs.

The AU Alarms Menu

The AU Alarms menu enables to configure relevant parameters and to view current statistics. The AU Alarms menu is available only with Administrator access rights, except for **Show All AU Alarms Parameters and Data** that is also available with Installer access rights.

- **AU Alarms Option** - Enables to enable or disable the AU Alarms feature. The default is **Disable**.
- **Learning Period** - Enables to define the period dedicated to accumulating information without generating alarms (except for the **No association** alarm).

  Valid values: 1 to 1440 (minutes)

  Default: **30** (minutes)
- **Test Cycle** - Enables to define the time between two consecutive transmissions of a polling message and for calculating the current averages for the various traffic statistics.

  Valid values: 1 to 1440 (minutes)

  Default: **10** (minutes)
- **Traffic Statistics** - A sub menu that includes the following options:

  ❖Retransmissions Rate Parameters

  ❖Dropped Frames Rate Parameters

  ❖CRC Error Rate Parameters

  ❖Duplicate Frames Rate Parameters

  For each of these traffic statistics types, a sub menu enables to configure three parameters:

  - **Minor Alarm Minimum Delta** - The minimum difference between the **Current Rate** and the previous **Average Rate**, for activating a minor severity alarm, for the relevant statistics type. Another prerequisite for activating the alarm is that the relevant **Current Rate** exceeds the applicable **Minor Alarm Threshold**.

    Valid range: 0 to 100 (%)
  - **Minor Alarm Threshold** - The threshold for activating a minor severity alarm for the relevant traffic statistics type. Another prerequisite for activating the alarm is that the difference between the applicable **Current Rate** and the previous **Average Rate** exceeds the **Minor Alarm Minimum Delta**.

    Valid range: 1 to 100 (%)
  - **Major Alarm Threshold** - The threshold for activating a major severity alarm for the relevant statistics type.

    Valid range: 1 to 100 (%)

The default parameters for these alarms is as follows:

Parameter	Default (%)
Retransmission Minor Alarm Minimum Delta	20
Retransmission Minor Alarm Threshold	30
Retransmission Major Alarm Threshold	60
Dropped Frames Minor Alarm Minimum Delta	10
Dropped Frames Minor Alarm Threshold	10
Dropped Frames Major Alarm Threshold	20
CRC Error Minor Alarm Minimum Delta	20
CRC Error Minor Alarm Threshold	40
CRC Error Major Alarm Threshold	70
Duplicate Frames Minor Alarm Minimum Delta	5
Duplicate Frames Minor Alarm Threshold	5
Duplicate Frames Major Alarm Threshold	15

NOTE:

The value of the Major Alarm Threshold must be higher than the applicable Minor Alarm Threshold. The system will not accept a Major Alarm Threshold that is lower than the current Minor Alarm Threshold, and vice versa.

- **Show Traffic Statistics Parameters and Data** - Displays for each statistics type the configured parameters as well as the applicable Current and Average Rates.

- **SU Rx Power Test** - A sub menu that includes the following options:
  - **SU Rx Power Decrease Threshold** - The minimum inverse (negative) value of the **SU Rx Power Average Delta** that will trigger an alarm.

    Valid values: 1 to 99 (dBm).

    Default value: 15 (dBm).
  - **Show SU Rx Power Test Parameters and Data** - Displays the value of the **SU Rx Power Decrease Threshold** and the current **SU Rx Power Average Delta**.
- **AU Rx Power Test** - A sub menu that includes the following options:
  - **AU Rx Power Decrease Threshold**- The minimum inverse (negative) value of the **AU Rx Power Average Delta** that will trigger an alarm.

    Valid values: 1 to 99 (dBm).

Default value: 15 (dBm).

- ❖ **Show AU Rx Power Test Parameters and Data** - Displays the value of the **AU Rx Power Decrease Threshold** and the current **AU Rx Power Average Delta**.

◆ **Responding SUs** - a sub menu that includes the following options:

- ❖ **Minimum Average Number Of SUs** - Enables to define the minimum average number of SUs required for association tests.

  Valid values: 1 to 254 (SUs)

  Default value: 5 (SUs)

- ❖ **Show Responding SUs Parameters and Data** - Displays the value of the **Minimum Average Number Of Responding SUs** and the **Current** and **Average Number Of Responding SUs**.

◆ **Alarms Status** - a sub menu that includes the following options:

- ❖ **Clear All alarms** - Enable to clear (set off) all the AU Alarms.
- ❖ **Show Turned On Alarms** - Displays a list of all the alarms that are turned on and the severity of each of these alarms.

◆ **Show All AU Alarms Parameters and Data** - Displays the values of all AU Alarms parameters as well as all the current results available in **Show Traffic Statistics Parameters and Data**, in **Show SU Rx Power Test Parameters and Data**, in **Show AU Rx Power Test Parameters and Data** and in **Show Turned On Alarms**.

Advanced Configuration Menu

The *Advanced Configuration* menu provides access to all the parameters, including the parameters that are available through the *Basic Configuration* menu.

The *Advanced Configuration* menu provides access to the following menus:

- IP Parameters (AU, SU and GU) (see page 2-36)
- Air Interface Parameters (AU and SU) (see page 2-37)
- Network Management Parameters (AU, SU and GU) (see page 2-66)
- Bridge Parameters (AU and SU) (see page 2-69)
- VLAN Parameters (GU) (see page 2-69)
- Performance Parameters (AU and SU) (see page 2-82)
- Service Parameters (AU and SU) (see page 2-86)
- RADIUS Parameters (SU) (see page 2-90)
- Security Parameters (AU and SU) (see page 2-94)
- Voice Parameters (SU with voice support) (see page 2-96)
- Dialing Parameters (SU with voice support) (see page 2-97)
- Telephony Signals Parameters (SU with voice support) (see page 2-104)
- Hopping Parameters (GU) (see page 2-110)
- Alarm Parameters (GU) (see page 2-112)

IP Parameters (AU, SU and GU)

The *IP Parameters* sub-menu allows configuration of the following parameters:

- **IP Address –** Displays the current IP address of the unit and allows the entry of a new IP address.

  The default IP Address is **10.0.0.1**.

- **Subnet Mask –** Displays the current subnet mask of the unit and allows entry of a new subnet mask.

  The default mask is **255.0.0.0**.

- **Default Gateway Address –** Displays the current address of the default gateway of the unit and allows entry of a new default gateway address.

  The default is **0.0.0.0**.

- **DHCP Client**
  - **DHCP Options –** Displays the current status of the DHCP (Dynamic Host Configuration Protocol) support, and allows selecting a new operation mode. The available options are:
    - **Disable –** Use manual procedure for configuring the IP parameters.
    - **DHCP Only** – Search for a DHCP Server and obtain the IP parameters from it (***IP Address***, ***Subnet Mask*** and ***Default Gateway Address***).
    - **Automatic** – Search for a DHCP Server for configuration of the IP parameters. If a DHCP Server is not found within approximately 40 seconds, use the currently configured IP parameters.

      The default is **Disable**.
  - **Access to DHCP –** To define the port through which the unit is allowed to communicate with a DHCP server. The options are:
    - **From Wlan Only**
    - **From Ethernet Only**
    - **From Both Ethernet & WLAN**

      The default for an Access Unit is **From Ethernet Only**. The default for a Subscriber Unit is **From Wlan Only**.

NOTE:

The ***Access to DHCP*** option is not available in the GU, as this module does not have a wireless link interface.

- **Show IP Parameters –** Displays the current values of the IP Parameters.

Air Interface Parameters (AU and SU)

Hopping Frequencies Setting Parameters

The process of setting the hopping sequence includes the following steps:

a. Select the frequencies to be used

b. Define the method of generating the basic hopping sequence based on the set of selected frequencies. The method of generating the basic sequence also defines the hopping shift mechanism for generating different actual hopping sequences.

c. Define a different hopping sequence for each AU in order to minimize interference between adjacent AUs.

NOTE:

The same method for generating the basic hopping sequence (and the hopping shift mechanism) should be used for all units in the system to enable SUs to communicate with the AUs and to support radio planning that will provide minimal interference between neighboring sectors.

- The method for configuring the basic set of hopping frequencies depends on the frequency band and on other parameters:
  - In products that operate in the **5.2 GHz** band the hopping frequencies are defined using the **Flexible Hopping Definition** menu.
  - In **5.7 GHz** products that are configured in the factory to operate in **ISM US FCC** mode only, or when the selected Hopping Band is either **ISM US FCC or ISM International**, the **Frequency Offset** parameter can be used to shift the hopping frequencies band.
  - In **5.7 GHz** products where the **Hopping Band** parameters is set to **Flexible Hopping Definition**, the **Flexible Hopping Definition** menu is used to define the hopping frequencies.
- **Hopping Band –** (5.7 GHz products only) - Available in units with INT option only. Defines the method of generating the basic hopping sequence. The available selections are **ISM US FCC, ISM International** and **Flexible Hopping Definition**.
  - **ISM US FCC:** The basic hopping sequence is as defined in the IEEE 802.11 standard and shown in Table 2-3. There are 79 hopping frequencies, using channels 2 to 80. (The channel number is the distance in MHz from the beginning of the frequency band, so that channel number 2 is at 5727MHz). Synchronization is not supported (Hopping Sync parameter is set to Idle and cannot be changed).
  - **ISM International:** The basic hopping sequence is as defined in the IEEE 802.11 standard and shown in Table 2-3. There are 79 hopping frequencies, using channels 2 to 80. (The channel number is the distance in MHz from the beginning of the frequency band, so that channel number 2 is at 5727MHz). Synchronization (Hopping Sync) is supported.
  - **Flexible Hopping Definition:** The **Flexible Hopping Definition** menu should be used to define the basic hopping sequence.

NOTE:

In 5.7 GHz units that are configured in the factory to operate only in **ISM US FCC** hopping standard (US Option), the *Hopping Band* menu is not available.

Table 2-3: ISM Basic Hopping Sequence

Index	Channel #	Frequency (MHz)		Index	Channel #	Frequency (MHz)		Index	Channel #	Frequency (MHz)
1	2	5727		28	5	5730		55	15	5740
2	25	5750		29	39	5764		56	35	5760
3	64	5789		30	12	5737		57	67	5792
4	10	5735		31	36	5761		58	52	5777
5	45	5770		32	68	5793		59	58	5783
6	18	5743		33	9	5734		60	44	5769
7	73	5798		34	70	5795		61	50	5775
8	49	5774		35	77	5802		62	17	5742
9	21	5746		36	6	5731		63	7	5732
10	63	5788		37	62	5787		64	19	5744
11	78	5803		38	29	5754		65	8	5733
12	31	5756		39	14	5739		66	69	5794
13	61	5786		40	27	5752		67	51	5776
14	24	5749		41	16	5741		68	42	5767
15	54	5779		42	59	5784		69	3	5728
16	65	5790		43	43	5768		70	30	5755
17	28	5753		44	76	5801		71	57	5782
18	79	5804		45	34	5759		72	37	5762
19	33	5758		46	72	5797		73	55	5780
20	4	5729		47	11	5736		74	26	5751
21	20	5745		48	60	5785		75	46	5771
22	13	5738		49	80	5805		76	53	5778
23	38	5763		50	47	5772		77	40	5765
24	74	5799		51	22	5747		78	32	5757
25	56	5781		52	75	5800		79	48	5773
26	71	5796		53	66	5791				
27	23	5748		54	41	5766				

- **Frequency Offset (5.7 GHz series only)** - The Frequency Offset parameter is applicable only if the Hopping Band is either ISM US FCC or ISM International. It has no effect in Flexible Hopping Definition mode. The Frequency Offset defines the "shift" in MHz of each channel in the hopping sequence relative to the frequency in

the base sequence. For example, if the Frequency Offset is 10, channel 2 will be at 5737 MHz (5727 + 10).

The permitted range in ISM US FCC is 0 to 45 (MHz). In ISM International mode the valid range is 0 to 70 (MHz).

The default value is **0** (MHz).

- **Flexible Hopping Definition –**Adds and removes frequencies to/from the list of hopping frequencies; displays the selected hopping frequencies and the current hopping sequence (based on the previous selections made before the last reset). The new selections will come into effect only after the next reset.

  The default sequence (including the case where all frequencies were deleted) is:

  5.2 GHz series: **5153** MHz

  5.7 GHz series: **5726** MHz

  - **Add Frequencies –** Adds discrete hopping frequencies or frequency ranges. Enter a list of frequencies and/or frequency ranges to be added. Use a comma to separate between entries (no spaces).
    - **5.7 GHz series**: The allowed entries are from 5725 to 5850 in steps of 1 MHz.

      Example: Enter 5725 - 5730, 5735 in the list to add the frequency channels 5725, 5726, 5727, 5728, 5729, 5730 and 5735 MHz.

NOTE:

In some countries the permitted range is from 5725 to 5875 MHz..

    - **5.2 GHz series**: The available range is from 5151 to 5350 MHz using a 1 MHz grid. The minimum distance between channels is 2 MHz.

      Example 1: Adding the band 5151- 5160 is equivalent to adding the discrete frequencies 5151, 5153, 5155, 5157 and 5159 MHz.

      Example 2: Adding the band 5152 - 5160 is equivalent to adding the discrete frequencies 5152, 5154, 5156, 5158 and 5160 MHz.

      Example 3: A trial to add 5152 - 5160, 5161 will be rejected because it does not meet the requirement for a minimum distance of 2 MHz between channels.

  - **Remove Frequencies** - Removes frequencies from the existing list. Enter a list of frequencies and/or frequency ranges to be removed, using the same guidelines as in ***Add Frequencies*** above. When a frequency range is removed, all frequencies in the range that are included in the list of frequencies to be used, are

removed, including the frequencies that define the range boundaries.

- **Erase All –** Erases all the entries from the list.
- **Scrambling Definition** – Defines the method of organizing the selected frequencies to form the actual hopping sequence to be used. Proper organization of the hopping sequence is essential to guarantee minimal cross interference among several collocated AUs that use the same sequence with different Hopping Shift values.
  - **Scrambling Mode –** Defines the scrambling mode. The following options are available:
    - **Standard Scrambling** – This mode is not recommended for sequences with 7 or more channels. The scrambled basic sequences for 3 to 6 frequencies when using Standard Scrambling are:

Table 2-4: Basic Sequences using Standard Scrambling

N (number of channels)	Scrambled Basic Sequence (channel indexes)
3	1, 3, 2
4	1, 3, 2, 4
5	1, 3, 5, 2, 4
6	1, 3, 5, 2, 6, 4

Frequency 1 (index=1) is the lowest frequency in the list of frequencies to be used, frequency 2 is the next frequency and so on.

    - **Manual Scrambling** – For customized definition of the hopping sequence, using the ***Manual Sequence Definition*** option (see below).
    - **Enhanced Scrambling** – Automatically generates hopping sequences using an enhanced algorithm. It is recommended that **Enhanced Scrambling** rather then **Standard Scrambling** be used. If the Enhanced Scrambling Mode is selected, the ***Spanning Factor*** parameter (see below) must be configured in the AU. The Enhanced Mode is not suitable for sequences with 6 or less frequencies. If Enhanced Scrambling is selected with sequences that have 6 or less frequencies, than Standard Scrambling is used by default.

      The scrambled sequence is generated according to the following rules:

      a.The first channel in the basic scrambled sequence is frequency 1 (Frequency 1 (index=1) is the lowest frequency in the list of frequencies to be used, frequency 2 is the next frequency and so on.)

b.The index of each of the other channels is calculated by adding the Spanning Factor to the index of the previous channel. Note that the sequence is cyclic, meaning that adding 1 to the highest index in the sequence (Index=N where N is the number of channels in the sequence) will result in the first channel (Index=1).

The scrambled basic sequence can also be calculated using the following formula:

$P_x(j) = \{[(j-1)*X] \bmod (N)\}+1$

Where:

X is the Spanning Factor

N is the number of channels in the sequence (modulus)

J is the sequence index

Example: N=8, X=3

$P_1(5)=\{[(1-1)*3\} \bmod 8\}+1=1$
$P_2(5)=\{[(2-1)*3\} \bmod 8\}+1=6$
$P_3(5)=\{[(3-1)*3\} \bmod 8\}+1=3$
$P_4(5)=\{[(4-1)*3\} \bmod 8\}+1=8$
$P_5(5)=\{[(5-1)*3\} \bmod 8\}+1=5$
$P_6(5)=\{[(6-1)*3\} \bmod 8\}+1=2$
$P_7(5)=\{[(7-1)*3\} \bmod 8\}+1=7$
$P_8(5)=\{[(8-1)*3\} \bmod 8\}+1=4$

And the basic scrambled sequence is:
1, 4, 7, 2, 5, 8, 3, 6.

- **Manual Sequence Definition** – Manually defines the hopping sequence, using numbered channel indexes (from 1 to "Number of Hopping Frequencies"). The sequence length must be equal to "Number of Hopping Frequencies" (all the defined frequencies must be used).
- **Erase Manual Sequence** – Erases the manually defined hopping sequence.

Spanning Factor (AU only) – Defines the ***Spanning Factor*** to be used by the Enhanced Scrambling mechanism. The ***Spanning Factor*** should be chosen so that the GCD (Greater Common Divisor) of the ***Spanning Factor*** and the ***Number of Hopping Frequencies*** would be 1 (e.g. for 8 frequencies possible values for the ***Spanning Factor*** are 1, 3, 5 and 7). The SU learns the value of the ***Spanning Factor*** from the AU during the association process.Use of different spanning factors by non-synchronized neighboring base stations reduces the probability of interference between adjacent sectors.

Valid values: 1 to Number of Hopping Frequencies minus 1, provided it meets the GCD requirement as described above.

It is not recommended to use spanning factors of 1 and N-1, as they result in hopping on consecutive channel (assuming that the available channels are consecutive). In these cases the advantage of using frequency hopping is not fully utilized, since a narrow band interference may affect several consecutive hops. Spanning factors of 2 and N-2 also result in a relatively poor spread of the hopping frequencies over the available frequency band.

Default Vale: **1**

NOTE:

During the association process, the SU learns the Scrambling Mode (and the Spanning Factor if applicable) of the AU. If the Scrambling Mode of the AU is different from the one configured for the SU, than after completing the association process the SU will use the Scrambling Mode of the AU.

Table 2-5: Spanning Factors and Hopping Sequences for Sequences with 7 to 25 Channels

Channels	Spanning Factor	Hopping Sequences
7	1 2 3 4 5 6	1, 2, 3, 4, 5, 6, 7 1, 3, 5, 7, 2, 4, 6 1, 4, 7, 3, 6, 2, 5 1, 5, 2, 6, 3, 7, 4 1, 6, 4, 2, 7, 5, 3 1, 7, 6, 5, 4, 3, 2
8	1 3 5 7	1, 2, 3, 4, 5, 6, 7, 8 1, 4, 7, 2, 5, 8, 3, 6 1, 6, 3, 8, 5, 2, 7, 4 1, 8, 7, 6, 5, 4, 3, 2
9	1 2 4 5 7 8	1, 2, 3, 4, 5, 6, 7, 8, 9 1, 3, 5, 7, 9, 2, 4, 6, 8 1, 5, 9, 4, 8, 3, 7, 2, 6 1, 6, 2, 7, 3, 8, 4, 9, 5 1, 8, 6, 4, 2, 9, 7, 5, 3 1, 9, 8, 7, 6, 5, 4, 3, 2
10	1 3 7 9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 1, 4, 7, 10, 3, 6, 9, 2, 5, 8 1, 8, 5, 2, 9, 6, 3, 10, 7, 4 1, 10, 9, 8, 7, 6, 5, 4, 3, 2

Channels	Spanning Factor	Hopping Sequences
11	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
	2	1, 3, 5, 7, 9, 11, 2, 4, 6, 8, 10
	3	1, 4, 7, 10, 2, 5, 8, 11, 3, 6, 9
	4	1, 5, 9, 2, 6, 10, 3, 7, 11, 4, 8
	5	1, 6, 11, 5, 10, 4, 9, 3, 8, 2, 7
	6	1, 7, 2, 8, 3, 9, 4, 10, 5, 11, 6
	7	1, 8, 4, 11, 7, 3, 10, 6, 2, 9, 5
	8	1, 9, 6, 3, 11, 8, 5, 2, 10, 7, 4
	9	1, 10, 8, 6, 4, 2, 11, 9, 7, 5, 3
	10	1, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
12	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
	5	1, 6, 11, 4, 9, 2, 7, 12, 5, 10, 3, 8
	7	1, 8, 3, 10, 5, 12, 7, 2, 9, 4, 11, 6
	11	1, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
13	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
	2	1, 3, 5, 7, 9, 11, 13, 2, 4, 6, 8, 10, 12
	3	1, 4, 7, 10, 13, 3, 6, 9, 12, 2, 5, 8, 11
	4	1, 5, 9, 13, 4, 8, 12, 3, 7, 11, 2, 6, 10
	5	1, 6, 11, 3, 8, 13, 5, 10, 2, 7, 12, 4, 9
	6	1, 7, 13, 6, 12, 5, 11, 4, 10, 3, 9, 2, 8
	7	1, 8, 2, 9, 3, 10, 4, 11, 5, 12, 6, 13, 7
	8	1, 9, 4, 12, 7, 2, 10, 5, 13, 8, 3, 11, 6
	9	1, 10, 6, 2, 11, 7, 3, 12, 8, 4, 13, 9, 5
	10	1, 11, 8, 5, 2, 12, 9, 6, 3, 13, 10, 7, 4
	11	1, 12, 10, 8, 6, 4, 2, 13, 11, 9, 7, 5, 3
	12	1, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
14	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
	3	1, 4, 7, 10, 13, 2, 5, 8, 11, 14, 3, 6, 9, 12
	5	1, 6, 11, 2, 7, 12, 3, 8, 13, 4, 9, 14, 5, 10
	9	1, 10, 5, 14, 9, 4, 13, 8, 3, 12, 7, 2, 11, 6
	11	1, 12, 9, 6, 3, 14, 11, 8, 5, 2, 13, 10, 7, 4
	13	1, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
15	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
	2	1, 3, 5, 7, 9, 11, 13, 15, 2, 4, 6, 8, 10, 12, 14
	4	1, 5, 9, 13, 2, 6, 10, 14, 3, 7, 11, 15, 4, 8, 12
	7	1, 8, 15, 7, 14, 6, 13, 5, 12, 4, 11, 3, 10, 2, 9
	8	1, 9, 2, 10, 3, 11, 4, 12, 5, 13, 6, 14, 7, 15, 8
	11	1, 12, 8, 4, 15, 11, 7, 3, 14, 10, 6, 2, 13, 9, 5
	13	1, 14, 12, 10, 8, 6, 4, 2, 15, 13, 11, 9, 7, 5, 3
	14	1, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
16	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
	3	1, 4, 7, 10, 13, 16, 3, 6, 9, 12, 15, 2, 5, 8, 11, 14
	5	1, 6, 11, 16, 5, 10, 15, 4, 9, 14, 3, 8, 13, 2, 7, 12
	7	1, 8, 15, 6, 13, 4, 11, 2, 9, 16, 7, 14, 5, 12, 3, 10
	9	1, 10, 3, 12, 5, 14, 7, 16, 9, 2, 11, 4, 13, 6, 15, 8
	11	1, 12, 7, 2, 13, 8, 3, 14, 9, 4, 15, 10, 5, 16, 11, 6
	13	1, 14, 11, 8, 5, 2, 15, 12, 9, 6, 3, 16, 13, 10, 7, 4
	15	1, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2

Channels	Spanning Factor	Hopping Sequences
17	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
	2	1, 3, 5, 7, 9, 11, 13, 15, 17, 2, 4, 6, 8, 10, 12, 14, 16
	3	1, 4, 7, 10, 13, 16, 2, 5, 8, 11, 14, 17, 3, 6, 9, 12, 15
	4	1, 5, 9, 13, 17, 4, 8, 12, 16, 3, 7, 11, 15, 2, 6, 10, 14
	5	1, 6, 11, 16, 4, 9, 14, 2, 7, 12, 17, 5, 10, 15, 3, 8, 13
	6	1, 7, 13, 2, 8, 14, 3, 9, 15, 4, 10, 16, 5, 11, 17, 6, 12
	7	1, 8, 15, 5, 12, 2, 9, 16, 6, 13, 3, 10, 17, 7, 14, 4, 11
	8	1, 9, 17, 8, 16, 7, 15, 6, 14, 5, 13, 4, 12, 3, 11, 2, 10
	9	1, 10, 2, 11, 3, 12, 4, 13, 5, 14, 6, 15, 7, 16, 8, 17, 9
	10	1, 11, 4, 14, 7, 17, 10, 3, 13, 6, 16, 9, 2, 12, 5, 15, 8
	11	1, 12, 6, 17, 11, 5, 16, 10, 4, 15, 9, 3, 14, 8, 2, 13, 7
	12	1, 13, 8, 3, 15, 10, 5, 17, 12, 7, 2, 14, 9, 4, 16, 11, 6
	13	1, 14, 10, 6, 2, 15, 11, 7, 3, 16, 12, 8, 4, 17, 13, 9, 5
	14	1, 15, 12, 9, 6, 3, 17, 14, 11, 8, 5, 2, 16, 13, 10, 7, 4
	15	1, 16, 14, 12, 10, 8, 6, 4, 2, 17, 15, 13, 11, 9, 7, 5, 3
	16	1, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
18	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
	5	1, 6, 11, 16, 3, 8, 13, 18, 5, 10, 15, 2, 7, 12, 17, 4, 9, 14
	7	1, 8, 15, 4, 11, 18, 7, 14, 3, 10, 17, 6, 13, 2, 9, 16, 5, 12
	11	1, 12, 5, 16, 9, 2, 13, 6, 17, 10, 3, 14, 7, 18, 11, 4, 15, 8
	13	1, 14, 9, 4, 17, 12, 7, 2, 15, 10, 5, 18, 13, 8, 3, 16, 11, 6
	17	1, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
19	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
	2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 2, 4, 6, 8, 10, 12, 14, 16, 18
	3	1, 4, 7, 10, 13, 16, 19, 3, 6, 9, 12, 15, 18, 2, 5, 8, 11, 14, 17
	4	1, 5, 9, 13, 17, 2, 6, 10, 14, 18, 3, 7, 11, 15, 19, 4, 8, 12, 16
	5	1, 6, 11, 16, 2, 7, 12, 17, 3, 8, 13, 18, 4, 9, 14, 19, 5, 10, 15
	6	1, 7, 13, 19, 6, 12, 18, 5, 11, 17, 4, 10, 16, 3, 9, 15, 2, 8, 14
	7	1, 8, 15, 3, 10, 17, 5, 12, 19, 7, 14, 2, 9, 16, 4, 11, 18, 6, 13
	8	1, 9, 17, 6, 14, 3, 11, 19, 8, 16, 5, 13, 2, 10, 18, 7, 15, 4, 12
	9	1, 10, 19, 9, 18, 8, 17, 7, 16, 6, 15, 5, 14, 4, 13, 3, 12, 2, 11
	10	1, 11, 2, 12, 3, 13, 4, 14, 5, 15, 6, 16, 7, 17, 8, 18, 9, 19, 10
	11	1, 12, 4, 15, 7, 18, 10, 2, 13, 5, 16, 8, 19, 11, 3, 14, 6, 17, 9
	12	1, 13, 6, 18, 11, 4, 16, 9, 2, 14, 7 19, 12, 5, 17, 10, 3, 15, 8
	13	1, 14, 8, 2, 15, 9, 3, 16, 10, 4, 17, 11, 5, 18, 12, 6, 19, 13, 7
	14	1, 15, 10, 5, 19, 14, 9, 4, 18, 13, 8, 3, 17, 12, 7, 2, 16, 11, 6
	15	1, 16, 12, 8, 4, 19, 15, 11, 7, 3, 18, 14, 10, 6, 2, 17, 13, 9, 5
	16	1, 17, 14, 11, 8, 5, 2, 18, 15, 12, 9, 6, 3, 19, 16, 13, 10, 7, 4
	17	1, 18, 16, 14, 12, 10, 8, 6, 4, 2, 19, 17, 15, 13, 11, 9, 7, 5, 3
	18	1, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
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	7	1, 8, 15, 2, 9, 16, 3, 10, 17, 4, 11, 18, 5, 12, 19, 6, 13, 20, 7, 14
	9	1, 10, 19, 8, 17, 6, 15, 4, 13, 2, 11, 20, 9, 18, 7, 16, 5, 14, 3, 12
	11	1, 12, 3, 14, 5, 16, 7, 18, 9, 20, 11, 2, 13, 4, 15, 6, 17, 8, 19, 10
	13	1, 14, 7, 20, 13, 6, 19, 12, 5, 18, 11, 4, 17, 10, 3, 16, 9, 2, 15, 8
	17	1, 18, 15, 12, 9, 6, 3, 20, 17, 14, 11, 8, 5, 2, 19, 16, 13, 10, 7, 4
	19	1, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2

Channels	Spanning Factor	Hopping Sequences
21	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
	2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
	4	1, 5, 9, 13, 17, 21, 4, 8, 12, 16, 20, 3, 7, 11, 15, 19, 2, 6, 10, 14, 18
	5	1, 6, 11, 16, 21, 5, 10, 15, 20, 4, 9, 14, 19, 3, 8, 13, 18, 2, 7, 12, 17
	8	1, 9, 17, 4, 12, 20, 7, 15, 2, 10, 18, 5, 13, 21, 8, 16, 3, 11, 19, 6, 14
	10	1, 11, 21, 10, 20, 9, 19, 8, 18, 7, 17, 6, 16, 5, 15, 4, 14, 3, 13, 2, 12
	11	1, 12, 2, 13, 3, 14, 4, 15, 5, 16, 6, 17, 8, 19, 9, 20, 10, 21, 11
	13	1, 14, 6, 19, 11, 3, 16, 8, 21, 13, 5, 18, 10, 2, 15, 7, 20, 12, 4, 17, 9
	16	1, 17, 12, 7, 2, 18, 13, 8, 3, 19, 14, 9, 4, 20, 15, 10, 5, 21, 16, 11, 6
	17	1, 18, 14, 10, 6, 2, 19, 15, 11, 7, 3, 20, 16, 12, 8, 4, 21, 17, 13, 9, 5
	19	1, 20, 18, 16, 14, 12, 10, 8, 6, 4, 2 , 21, 19, 17, 15, 13, 11, 9, 7, 5, 3
	20	1, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
22	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
	3	1, 4, 7, 10, 13, 16, 19, 22, 3, 6, 9, 12, 15, 18, 21, 2, 5, 8, 11, 14, 17, 20
	5	1, 6, 11, 16, 21, 4, 9, 14, 19, 2, 7, 12, 17, 22, 5, 10, 15, 20, 3, 8, 13, 18
	7	1, 8, 15, 22, 7, 14, 21, 6, 13, 20, 5, 12, 19, 4, 11, 18, 3, 10, 17, 2, 9, 16
	9	1, 10, 19, 6, 15, 2, 11, 20, 7, 16, 3, 12, 21, 8, 17, 4, 13, 22, 9, 18, 5, 14
	13	1, 14, 5, 18, 9, 22, 13, 4, 17, 8, 21, 12, 3, 16, 7, 20, 11, 2, 15, 6, 19, 10
	15	1, 16, 9, 2, 17, 10, 3, 18, 11, 4, 19, 12, 5, 20, 13, 6, 21, 14, 7, 22, 15, 8
	17	1, 18, 13, 8, 3, 20, 15, 10, 5, 22, 17, 12, 7, 2, 19, 14, 9, 4, 21, 16, 11, 6
	19	1, 20, 17, 14, 11, 8, 5, 2, 21, 18, 15, 12, 9, 6, 3, 22, 19, 16, 13, 10, 7, 4
	21	1, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
23	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23
	2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22
	3	1, 4, 7, 10, 13, 16, 19, 22, 2, 5, 8, 11, 14, 17, 20, 23, 3, 6, 9, 12, 15, 18, 21
	4	1, 5, 9, 13, 17, 21, 2, 6, 10, 14, 18, 22, 3, 7, 11, 15, 19, 23, 4, 8, 12, 16, 20
	5	1, 6, 11, 16, 21, 3, 8, 13, 18, 23, 5, 10, 15, 20, 2, 7, 12, 17, 22, 4, 9, 14, 19
	6	1, 7, 13, 19, 2, 8, 14, 20, 3, 9, 15, 21, 4, 10, 16, 22, 5, 11, 17, 23, 6, 12, 18
	7	1, 8, 15, 22, 6, 13, 20, 4, 11, 18, 2, 9, 16, 23, 7, 14, 21, 5, 12, 19, 3, 10, 17
	8	1, 9, 17, 2, 10, 18, 3, 11, 19, 4, 12, 20, 5, 13, 21, 6, 14, 22, 7, 15, 23, 8, 16
	9	1, 10, 19, 5, 14, 23, 9, 18, 4, 13, 22, 8, 17, 3, 12, 21, 7, 16, 2, 11, 20, 6, 15
	10	1, 11, 21, 8, 18, 5, 15, 2, 12, 22, 9, 19, 6, 16, 3, 13, 23, 10, 20, 7, 17, 4, 14
	11	1, 12, 23, 11, 22, 10, 21, 9, 20, 8, 19, 7, 18, 6, 17, 5, 16, 4, 15, 3, 14, 2, 13
	12	1, 13, 2, 14, 3, 15, 4, 16, 5, 17, 6, 18, 7, 19, 8, 20, 9, 21, 10, 22, 11, 23, 12
	13	1, 14, 4, 17, 7, 20, 10, 23, 13, 3, 16, 6, 19, 9, 22, 12, 2, 15, 5, 18, 8, 21, 11
	14	1, 15, 6, 20, 11, 2, 16, 7, 21, 12, 3, 17, 8, 22, 13, 4, 18, 9, 23, 14, 5, 19, 10
	15	1, 16, 8, 23, 15, 7, 22, 14, 6, 21, 13, 5, 20, 12, 4, 19, 11, 3, 18, 10, 2, 17, 9
	16	1, 17, 10, 3, 19, 12, 5, 21, 14, 7, 23, 16, 9, 2, 18, 11, 4, 20, 13, 6, 22, 15, 8
	17	1, 18, 12, 6, 23, 17, 11, 5, 22, 16, 10, 4, 21, 15, 9, 3, 20, 14, 8, 2, 19, 13, 7
	18	1, 19, 14, 9, 4, 22, 17, 12, 7, 2, 20, 15, 10, 5, 23, 18, 13, 8, 3, 21, 16, 11, 6
	19	1, 20, 16, 12, 8, 4, 23, 19, 15, 11, 7, 3, 22, 18, 14, 10, 6, 2, 21, 17, 13, 9, 5
	20	1, 21, 18, 15, 12, 9, 6, 3, 23, 20, 17, 14, 11, 8, 5, 2, 22, 19, 16, 13, 10, 7, 4
	21	1, 22, 20, 18, 16, 14, 12, 10, 8, 6, 4, 2, 23, 21, 19, 17, 15, 13, 11, 9, 7, 5, 3
	22	1, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2
24	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
	5	1, 6, 11, 16, 21, 2, 7, 12, 17, 22, 3, 8, 13, 18, 23, 4, 9, 14, 19, 24, 5, 10, 15, 20
	7	1, 8, 15, 22, 5, 12, 19, 2, 9, 16, 23, 6, 13, 20, 3, 10, 17, 24, 7, 14, 21, 4, 11, 18
	11	1, 12, 23, 10, 21, 8, 19, 6, 17, 4, 15, 2, 13, 24, 11, 22, 9, 20, 7, 18, 5, 16, 3, 14
	13	1, 14, 3, 16, 5, 18, 7, 20, 9, 22, 11, 24, 13, 2, 15, 4, 17, 6, 19, 8, 21, 10, 23, 12
	17	1, 18, 11, 4, 21, 14, 7, 24, 17, 10, 3, 20, 13, 6, 23, 16, 9, 2, 19, 12, 5, 22, 15, 8
	19	1, 20, 15, 10, 5, 24, 19, 14, 9, 4, 23, 18, 13, 8, 3, 22, 17, 12, 7, 2, 21, 16, 11, 6
	23	1, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2

Channels	Spanning Factor	Hopping Sequences
25	1	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25
	2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
	3	1, 4, 7, 10, 13, 16, 19, 22, 25, 3, 6, 9, 12, 15, 18, 21, 24, 2, 5, 8, 11, 14, 17, 20, 23
	4	1, 5, 9, 13, 17, 21, 25, 4, 8, 12, 16, 20, 24, 3, 7, 11, 15, 19, 23, 2, 6, 10, 14, 18, 22
	6	1, 7, 13, 19, 25, 6, 12, 18, 24, 5, 11, 17, 23, 4, 10, 16, 22, 3, 9, 15, 21, 2, 8, 14, 20
	7	1, 8, 15, 22, 4, 11, 18, 25, 7, 14, 21, 3, 10, 17, 24, 6, 13, 20, 2, 9, 16, 23, 5, 12, 19
	8	1, 9, 17, 25, 8, 16, 24, 7, 15, 23, 6, 14, 22, 5, 13, 21, 4, 12, 20, 3, 11, 19, 2, 10, 18
	9	1, 10, 19, 3, 12, 21, 5,14, 23, 7, 16, 25, 9, 18, 2, 11, 20, 4, 13, 22, 6, 15, 24, 8, 17
	11	1, 12, 23, 9, 20, 6, 17, 3, 14, 25, 11, 22, 8, 19, 5, 16, 2, 13, 24, 10, 21, 7, 18, 4, 15
	12	1, 13, 25, 12, 24, 11, 23, 10, 22, 9, 21, 8, 20, 7, 19, 6, 18, 5, 17, 4, 16, 3, 15, 2, 14
	13	1, 14, 2, 15, 3, 16, 4, 17, 5, 18, 6, 19, 7, 20, 8, 21, 9, 22, 10, 23, 11, 24, 12, 25, 13
	14	1, 15, 4, 18, 7, 21, 10, 24, 13, 2, 16, 5, 19, 8, 22, 11, 25, 14, 3, 17, 6, 20, 9, 23, 12
	16	1, 17, 8, 24, 15, 6, 22, 13, 4, 20, 11, 2, 18, 9, 25, 16, 7, 23, 14, 5, 21, 12, 3, 19, 10
	17	1, 18, 10, 2, 19, 11, 3, 20, 12, 4, 21, 13, 5, 22, 14, 6, 23, 15, 7, 24, 16, 8, 25, 17, 9
	18	1, 19, 12, 5, 23, 16, 9, 2, 20, 13, 6, 24, 17, 10, 3, 21, 14, 7, 25, 18, 11, 4, 22, 15, 8
	19	1, 20, 14, 8, 2, 21, 15, 9, 3, 22, 16, 10, 4, 23, 17, 11, 5, 24, 18, 12, 6, 25, 19, 13, 7
	21	1, 22, 18, 14, 10, 6, 2, 23, 19, 15, 11, 7, 3, 24, 20, 16, 12, 8, 4, 25, 21, 17, 13, 9, 5
	22	1, 23, 20, 17, 14, 11, 8, 5, 2, 24, 21, 18, 15, 12, 9, 6, 3, 25, 22, 19, 16, 13, 10, 7, 4
	23	1, 24, 22, 20, 18, 16, 14, 12, 10, 8, 6, 4, 2, 25, 23, 21, 19, 17, 15, 13, 11, 9, 7, 5, 3
	25	1, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2

- ❖ **Show Flexible Hopping Parameters –** Displays the following information:
  - An updated list of the defined sub-bands and discrete frequencies to become effective after the next reset. A sub-band is defined by the first and last hopping frequency in a series of consecutive frequencies, with 3MHz separation between frequencies.
  - An updated list of all the hopping frequencies to be used after the next reset.
  - Scrambling Mode
  - Manual Sequence Definition (if applicable)
  - Spanning Factor (if applicable. In the SU it will be shown only when operating in the Enhanced Scrambling mode)
  - The current sequence of operational hopping frequencies

- ◆ **Hopping Shift** –Displays the current ***Hopping Shift*** parameter and allows entry of a new value. Available only in AUs. All the associated SUs learn the value of the ***Hopping Shift*** parameter from the AU during the association process. The ***Hopping Shift*** parameter is used to provide different operational hopping sequences when several co-located Access Units use the same set of hopping frequencies and the same scrambling method (and hence the same basic hopping sequence). Correct selection of different hopping shift values for adjacent AUs will minimize the cross interference among these AUs and will allow for better spectrum utilization.

  When setting this parameter, consider the following relationship: *Max. Hopping Shift (channels) = Number of hopping frequencies-1*.

  The method of using the Hopping Shift for generating the actual hopping sequences depends on the method used for defining the basic hopping sequence: ISM Standard Sequence (5.7 GHz products only), Standard Scrambling, Enhanced Scrambling or Manual Sequence Definition.

  - ❖ **ISM Hopping Sequence (5.7 GHz products only):**

    If **ISM US FCC** or **ISM International** hopping standard is used, the shift operation is performed on the channels (frequencies) of the basic hopping sequence. The actual hopping channel (frequency) is calculating by adding the value of the Hopping Shift to the channel (frequency) of the basic hopping sequence. Note that the sequence is cyclic, meaning that adding 1 to channel 80 which is the highest channel, will result in channel 2 which is the lowest channel in the sequence. See Table 2-6 for an example of the actual hopping sequence with a hopping shift of 3, assuming a Frequency Offset of 0. If the frequency Offset is other than 0, its value in MHz must be added to each of the frequencies.

    When using the ISM hopping standard, it is recommended that the difference in the values of the hopping shifts used

by the units in any two adjacent sectors will be 3 (e.g. 0, 3, 6, ...) to minimize cross interference.

Table 2-6: ISM Hopping Sequence, Hopping Shift=3 (Frequency Offset = 0).

Index	Channel #	Frequency (MHz)		Index	Channel #	Frequency (MHz)		Index	Channel #	Frequency (MHz)
1	5	5730		28	8	5733		55	18	5743
2	28	5753		29	42	5767		56	38	5763
3	67	5792		30	15	5740		57	70	5795
4	13	5738		31	39	5764		58	55	5780
5	48	5773		32	71	5796		59	61	5786
6	21	5746		33	12	5737		60	47	5772
7	76	5801		34	73	5798		61	53	5778
8	52	5777		35	80	5805		62	20	5745
9	24	5749		36	9	5734		63	10	5735
10	66	5791		37	65	5790		64	22	5747
11	2	5727		38	32	5757		65	11	5736
12	34	5759		39	17	5742		66	72	5797
13	64	5789		40	30	5755		67	54	5779
14	27	5752		41	19	5744		68	45	5770
15	57	5782		42	62	5787		69	6	5731
16	68	5793		43	46	5771		70	33	5758
17	31	5756		44	79	5804		71	60	5785
18	3	5728		45	37	5762		72	40	5765
19	36	5761		46	75	5800		73	58	5783
20	7	5732		47	14	5739		74	29	5754
21	23	5748		48	63	5788		75	49	5774
22	16	5741		49	4	5729		76	56	5781
23	41	5766		50	50	5775		77	43	5768
24	77	5802		51	25	5750		78	35	5760
25	59	5784		52	78	5803		79	51	5776
26	74	5799		53	69	5794				
27	26	5751		54	44	5769				

❖ **Enhanced Scrambling mode:**
In this mode the shift operation is performed on the channel indexes. The actual hopping channel is calculated by increasing the indexes of the basic hopping sequence by the value of the Hopping Shift. Note that the sequence is cyclic, meaning that adding 1 to the highest index in the sequence (Index=N where N is the number of channels in the sequence) will result in the first channel (Index=1).

Example: Enhanced Scrambling, N=8, Spanning Factor=3:

Table 2-7: Hopping Shift Implementation, Enhanced Scrambling (N=8, Spanning Factor=3)

Hopping Shift	Actual Sequence Indexes
0 (basic sequence)	1, 4, 7, 2, 5, 8, 3, 6
1	2, 5, 8, 3, 6, 1, 4, 7
2	3, 6, 1, 4, 7, 2, 5, 8
3	4, 7, 2, 5, 8, 3, 6, 1
4	5, 8, 3, 6, 1, 4, 7, 2
5	6, 1, 4, 7, 2, 5, 8, 3
6	7, 2, 5, 8, 3, 6, 1, 4
7	8, 3, 6, 1, 4, 7, 2, 5

If for example the defined hopping frequencies are 5730, 5740, 5750, 5760, 5770, 5780, 5790, 5800, then the frequencies of the actual hopping sequences are:

Table 2-8: Actual Hopping sequences, Enhanced Scrambling (N=8, Spanning Factor=3)

Hopping Shift	Hop#1	Hop#2	Hop#3	Hop#4	Hop#5	Hop#6	Hop#7	Hop#8
0	5730	5760	5790	5740	5770	5800	5750	5780
1	5740	5770	5800	5750	5780	5730	5760	5790
2	5750	5780	5730	5760	5790	5740	5770	5800
3	5760	5790	5740	5770	5800	5750	5780	5730
4	5770	5800	5750	5780	5730	5760	5790	5740
5	5780	5730	5760	5790	5740	5770	5800	5750
6	5790	5740	5770	5800	5750	5780	5730	5760
7	5800	5750	5780	5730	5760	5790	5740	5770

The following formula can be used for calculating the actual hopping sequence:

$P_S(j)=\{[P_0(j)+S-1]\text{mod}(N)\}+1$

Where:

S=Hopping Shift

N=number of channels in the sequence (modulus)

$P_0(j)$=Channel no. j in the basic sequence (shift=0)

$P_S(j)$=Channel no. j in the actual sequence with hopping shift S

Example: The basic hopping sequence is 1, 4, 7, 2, 5, 8, 3, 6 (Enhanced Scrambling, N=8, Spanning Factor=3).

The actual hopping sequence for a hopping shift of 3 is:

$P_3(1)=[1+3-1]\text{mod}8+1=4$
$P_3(2)=[4+3-1]\text{mod}8+1=7$
$P_3(3)=[7+3-1]\text{mod}8+1=2$
$P_3(4)=[2+3-1]\text{mod}8+1=5$
$P_3(5)=[5+3-1]\text{mod}8+1=8$
$P_3(6)=[8+3-1]\text{mod}8+1=3$
$P_3(7)=[3+3-1]\text{mod}8+1=6$
$P_3(8)=[6+3-1]\text{mod}8+1=1$

The actual hopping sequence indexes are:
4, 7, 2, 5, 8, 3, 6, 1

Standard and Manual Scrambling:
In these modes the shift operation is performed on the sequence elements. The basic sequence is shifted cyclically according to the value of the Hopping Shift parameter, so that element no. i in the actual sequence equals element number i+s in the basic sequence, where s is the hopping shift. Thus, if the basic sequence is a, b, c, d, e, f then a shift of 1 will result in the sequence b, c, d, e, f, a,; a shift of 2 will result in the sequence c, d, e, f, a, b; and so forth.

Example: Standard Scrambling, N=6

Table 2-9: Hopping Shift Implementation, Standard Scrambling (N=6)

Hopping Shift	Actual Sequence
0 (basic sequence)	1, 3, 5, 2, 6, 4
1	3, 5, 2, 6, 4, 1
2	5, 2, 6, 4, 1, 3
3	2, 6, 4, 1, 3, 5
4	6, 4, 1, 3, 5, 2
5	4, 1, 3, 5, 2, 6

If the defined frequencies are 5730, 5740, 5750, 5760, 5770, 5780, then the frequencies of the actual hopping sequences are:

Table 2-10: Actual Hopping sequences, Standard Scrambling (N=6)

Hopping shift	Hop#1	Hop#2	Hop#3	Hop#4	Hop#5	Hop#6
0	5730	5750	5770	5740	5780	5760
1	5750	5770	5740	5780	5760	5730
2	5770	5740	5780	5760	5730	5750
3	5740	5780	5760	5730	5750	5770
4	5780	5760	5730	5750	5770	5740
5	5760	5730	5750	5770	5740	5780

The following formula can be used to calculate the actual hopping sequence:

$P_S(i)=P_0[(i+s-1)\bmod(N)+1]$

Where:

S is the hopping shift

N=number of channels in the sequence (modulus)

$P_S(i)$ is element number i in the actual sequence with hopping shift s

$P_0(i)$ is element number in the basic hopping sequence (s=0).

For example, in the basic sequence with N=6:

$P_0(1)=1$
$P_0(2)=3$
$P_0(3)=5$
$P_0(4)=2$
$P_0(5)=6$
$P_0(6)=4$

For a shift of 3, the actual sequence is:

$P_3(1)=P_0[(1+3-1)\bmod6+1]=P_0(4)=2$
$P_3(2)=P_0[(2+3-1)\bmod6+1]=P_0(5)=6$
$P_3(3)=P_0[(3+3-1)\bmod6+1]=P_0(6)=4$
$P_3(4)=P_0[(4+3-1)\bmod6+1]=P_0(1)=1$
$P_3(5)=P_0[(5+3-1)\bmod6+1]=P_0(2)=3$
$P_3(6)=P_0[(6+3-1)\bmod6+1]=P_0(3)=5$

And the actual hopping sequence is 2, 6, 4, 1, 3, 5.

The allowed range for the Hopping shift parameter is from 0 to N-1, where N is the number of hopping frequencies.

The default is **0**.

- **Hopping Sync** (BS-AU only) –Displays the current Hopping Sync status of the unit and allows defining a new status. When several AUs that use the same hopping set and different hopping sequences are co-located, their operation should be synchronized in terms of

hopping sequence initialization and timing. If a BS-GU GPS module is not used for synchronization, then one AU must be specified as a Master unit and all other units must be specified as Slave units. When a BS-GU is used, all AUs must be configured to Slave mode. Available options are:

- **Idle** – No synchronization (stand-alone operation)
- **Master** – The AU that serves as a Master unit providing synchronization signals to the Slave units
- **Slave** – An AU that operates as a Slave

The default is Idle.

WARNING:

When using a GPS system for synchronization, all AUs in the chassis must be set to Slave.

NOTE:

Synchronization is not allowed by the radio regulations in certain countries.

In 5.7 GHz units using the ISM US FCC hopping standard, the Hopping Sync option is not supported.

ESSID Parameters

The ESSID is a string used to identify a wireless network. It prevents the unintentional merging of two co-located wireless networks. An SU can only associate with an AU that has an identical ESSID. To facilitate easy additions of SUs to existing deployments, where different ESSIDs are used in neighboring sectors, a secondary "global" ESSID, namely Operator ESSID, is available in the AU.

- **ESSID** – The ESSID (Extended Service Set ID) of the unit. Use different ESSIDs to segment the wireless access network and add security to your network.

  Valid values: A string of up to 31 printable ASCII characters, case sensitive.

  The default value is **ESSID1**.

- **Operator ESSID Parameters** (AU only) – The Operator ESSID is a secondary ESSID that can only be configured in the AU. The Operator ESSID can be used to enhance flexibility and reduce configuration effort when adding new Subscriber Units to operational installations in which different ESSIDs were configured for different sectors that actually belong to the same network. In such installations, all AUs should be configured with the same Operator ESSID. The ESSID as well as the Operator ESSID are included in the AU's Beacon & Probe Response management frames. The SU shall regard such frames if the ESSID or Operator ESSID matches its own ESSID. The ESSID of the AU with which the SU is associated is defined as the Run-Time ESSID, to be used by the SU when communicating with the AU. The Run-Time ESSID is included

in the list displayed upon selecting either ***Show Air Interface Parameters*** or ***Show Basic Parameters*** options in the SU.

In new installations where all units are configured with the same ESSID, Operator ESSID need not be used.

The following parameters are available:

- **Operator ESSID Option** – Enables/disables the use of the Operator ESSID when communicating with SUs.

  The default is **Enable.**

- **Operator ESSID** – Defines the Operator ESSID.

  Valid values: a string of up to 31 printable ASCII characters, case sensitive.

  The default value is **ESSID1**.

Best AU Selection Parameters

In BreezeACCESS systems with software version 3.0 and below an SU can associate with any AU it can communicate with, provided they both use the same ESSID. An SU that can communicate with more than one AU using the same ESSID becomes associated with the first AU it "finds", not necessarily the best choice in terms of quality of communication or other factors such as number of SUs serviced by each AU. The same limitation also exists if only one AU in the neighborhood has an ESSID identical to the one used by the SU, since it is not always necessarily the best choice.

The topology of a fixed access network is constantly changing. Changes in base station deployment and subscriber density can accumulate to create substantial changes in SU performance. The quest for load sharing together with the desire to create best throughput conditions for the SU created the need for the Best AU feature, to enable a SU to connect to the best AU in its neighborhood.

When the Best AU feature is used, each of the AUs are given a quality mark based on the level at which it is received by the SU. The SU scans for a configured number of cycles, gathering information from all the AUs it can communicate with. At the end of the scanning period, the SU reaches a Best AU decision according to the information gathered. The AU with the highest quality mark is selected as the Best AU, and the SU will immediately try to associate with it.

The quality mark given to each AU depends on the level at which it is received by the SU.

The Best AU selection mechanism can be overridden by defining a specific AU as the preferred AU.

NOTE:

Although the SU selects the Best AU based on long-term conditions prior to the decision time, it may not always be connected to the instantaneous Best AU at any given time. Note also that the decision is done only once during the scanning interval. The decision may not remain the optimal one for ever. If there are significant changes in deployment of neighboring AUs and the SUs served by them, overall performance may be improved if the applicable SUs are reset intentionally so as to re-initiate the Best AU decision process.

- **Best AU Parameters in SU**

  - **Best AU Support** – Enables or disables the Best AU selection feature.

    The default is **Disable**.

NOTE:

If the Best AU feature is not used, the SU associates with the first AU it finds whose ESSID or Operator ESSID is identical to its own ESSID.

  - **Number of Scanning Attempts** – Defines the number of scanning cycles to be used for gathering information on neighboring AUs. A higher number may result in a better decision at the cost of an increased scanning time during which the SU is not operational.

    Valid values: 1 - 255.

    Default value: **20.**

    The scanning time can be calculated based on the following formula:

    Scanning Time (seconds) = N * C * 0.019

    N = Number of scanning attempts
    C = Number of channels in the hopping sequence
    0.019 seconds is the time spent on each channel (dwell time) while in scanning mode.

NOTE:

When Best AU support is enabled, it is recommended to use Active Scanning. If passive scanning is used, the SU may not hear the best AU (or the preferred AU). The higher the number of hopping channels, the higher the probability that the SU will not hear the best (or preferred) AU when passive scanning is used.

  - **Preferred AU MAC Address** – Defines a specific AU with which the SU should associate. Gaining control of the SUs association is a powerful tool in network management. The Preferred AU MAC Address parameter is intended for applications where there is a need to dictate the preferred AU with whom the SU should associate. To prevent the SU from associating with the first viable AU it finds, the Best AU Support mechanism should be enabled. Once the SU has identified the preferred AU based on

its MAC address, it will associate with it and terminate the scanning process. If the preferred AU is not found, the SU will associate with an AU according to the decision reached using the best AU algorithm.

Valid values: MAC address string

The default value for the Preferred AU MAC Address is **00-00-00-00-00-00** (12 zeros), meaning that there is no preferred AU.

- **Show Best AU Parameters and Data** – Displays the applicable information:
  - **Neighboring AU Data table** - Displayed for each AU that the unit can communicate with the following parameters:
    - **MAC Address**
    - **Received signal strength** – RSSI or dBm
    - **Mark** – The computed quality mark for the AU.
    - **Full** – The association load status of the AU. It is defined as full if the number of SUs associated with the AU has reached the maximum allowed according to the value of the ***Maximum Number of Associations*** parameter (see page 2-62). An AU whose associations load status is full cannot be selected as the Best AU, even if its' computed mark is the highest.
    - **ESSID** – The ESSID of the AU

    In addition to the neighboring AU data table, the following information is displayed:
    - **Best AU Support**
    - **Preferred AU MAC Address**
    - **Number of Scanning Attempts**
    - **Associated AU MAC Address** (the MAC address of the selected AU)
    - **Run Time ESSID** (the ESSID of the selected AU).

Power Control Parameters

The power control parameters enable to optimize the performance of the system through controlling the transmitted power level of BreezeACCESS units. The transmitted power level of the unit should be decreased from the maximum level that is supported by the unit in the following cases:

- In a Subscriber Unit that is relatively close to the Access Unit, in order to minimize the interference to signals received by the AU from other subscriber units as well as interference to neighboring cells.
- In an Access Unit typically the maximum supported transmit power is used to enable maximum coverage. However, there may be a need to decrease the transmitted power level in order to support relatively small cells and to minimize the interference with the operation of neighboring cells.

- If required for compliance with local regulations or other restrictions related to maximum allowable transmitted power.

In addition to the ability to set the transmit power to a certain fixed level, BreezeACCESS units support an Automatic Transmit Power Control (ATPC) algorithm. The ATPC algorithm automatically adjusts the power level transmitted by each SU according to the actual level at which it is received by the AU. To support proper operation of the system with optimal performance and minimum interference between neighboring sectors, the ATPC algorithm should be enabled in all units.

The algorithm is controlled by the AU that calculates for each received frame the average RSSI at which it receives transmissions from the specific SU. The average calculation takes into account the previous calculated average, thus reducing the effect of short temporary changes in link conditions. The weight of history (the previous value) in the formula used for calculating the average RSSI is determined by a configurable parameter. In addition, the higher the time that has passed since last calculation, the lower is the impact of history on the calculated average. If the average RSSI is not in the optimal range (typically between -74dBm to -64dBm), the AU transmits to the SU a power-up or a power-down message. The target is that each SU will be received at an optimal level, or as high as possible if the optimal range cannot be reached because of specific link conditions.

Each time that the SU tries to associate with the AU (following either a reset or loss of synchronization), it will initiate transmissions using the ***Current Transmit Power Control***, which is the last value that was previously used by the ATPC mechanism. If after a certain configurable time the SU did not succeed to synchronize with the AU, it will start transmitting using the level configured for the ***Transmit Power Control*** parameter. (If this is the first time that the SU is powered up, or if the ATPC algorithm was not used, the ***Current Transmit Power Control*** equals the value of ***Transmit Power Control***).

- **Transmit Power Control** – Controls the relative gain of the Tx power circuits.

  A value of 7 represents the highest transmit power level, which is the maximum level supported by the specific unit. A lower value represents a lower transmit power level. The effect of this parameter on the transmitted power is not linear, since it is affected by the length (attenuation) of the IF cable.

  In SUs, if the ATPC Option is enabled this parameter serves for setting the initial value to be used by the ATPC algorithm after the first time of powering-up the unit. It will also be used in the following cases:

  a. If the unit does not succeed to associate with the AU after reset

  b. If the unit does not succeed to re-synchronize with the AU after losing synchronization

c. If the SU is associated with the AU but there are too many successive dropped frames, indicating that it transmits at a level that may be too low.

The actual run-time value that is used to control the transmit power level is determined by the ATPC process.

The allowed range is from 0 to 7.

The effect of the Power Control Parameter on the actual power transmitted to the antenna port of the outdoor unit is according to Table 2-11 (5.7 GHz series) or Table 2-12 (5.2 GHz series).

Table 2-11: Transmit Power Output vs. Transmit Power Control (5.7 GHz series)

Transmit Power Control	Transmit Power at Antenna Port (dBm)
7	26 +/- 1
6	25.5 +/ 1.5
5	23 +/- 1.5
4	20 +/- 1.5
3	20.5 +/- 1.5
2	17 +/- 1.5
1	12 +/- 1.5
0	8.5 +/- 1.5

Table 2-12: Transmit Power Output vs. Transmit Power Control (5.2 GHz series)

Transmit Power Control	Transmit Power at Antenna Port (dBm)
7	25dBm +/- 1dB
6	24dBm +/- 1dB
5	21dBm +/- 1.5dB
4	18dBm +/- 1.5dB
3	16.5dBm +/- 1dB
2	12.5dBm +/- 1.5dB
1	8.5dBm +/- 1.5dB
0	5dBm +/- 1.5dB

The default value is **7** (maximum power). -

NOTE:

It is recommended not to change the ***Transmit Power Control*** parameter from its default value in units with HW revision G or earlier.

- **ATPC Parameters in AU**

- **ATPC Option**: To enable or disable the Automatic Transmit Power Control (ATPC) algorithm.

  The default is **Disable.**

- **Minimum RSSI Level**: Enables you to define the lowest level at which you want each SU to be received at the AU (the lower limit of the optimal reception level range).

  Available values: -100 to 0dBm.

  Default value: **-74** dBm for products operating in the 5.7 GHz band, and **-79** dBm for products operating in the 5.2 GHz band

- **Maximum RSSI Level**: Enables you to define the highest level at which you want each SU to be received at the AU (the higher limit of the optimal reception level range).

  Available values: -100 to 0 dBm.

  Default value: **-64** dBm for products operating in the 5.7 GHz band, and **-69** dBm for products operating in the 5.2 GHz band.

NOTE:

The value of the Maximum RRSI Level must be higher than the value of the Minimum RRSI Level. The system will not accept a Maximum RRSI Level value that is lower than the current Minimum RRSI Level value, and vice versa.

- **RSSI Memory Factor:** Enable you to define the parameter that determines the weight of history (value of last calculated average RSSI) in the formula used for calculating the average RSSI. The higher the value of this parameter, the higher is the weight of history in the formula.

  Available values: -1 to 32. -1 is for no weight for history, meaning that average RSSI equals the last measured RSSI.

  Default value: **5**

- **Minimum Interval Between ATPC Messages:** To set the minimal time between consecutive power-up/power-down messages to a specific SU. Setting a low value for this parameter may lead to a higher overhead and an excessive rate of power level changes at the SUs. High values for this parameter increase the time it will take until the SUs reach optimal transmit power level.

  Available values: 0 to 3600 seconds.

  Default value: **120** seconds.

- **ATPC Power Level Step** - The step size in percentages of maximum number of available levels that the SU will use when receiving an ATPC Power-Up/Power-Down message. The formula for calculating the step size is:
  Step=max{1, [ATPC Step*(No. of Levels-1)/100]} (rounded down).
  In SU-A/E the number of available levels is 8. Therefore, if ATPC Power Level Step is 29, than Step=2 [29*7/100=2.03], meaning

that the SU will increase/decrease the value of the Transmit Power Control parameter by 2. Any value lower than 29 will result in Step=1.

Available values: 1-100 (%)

Default value: **1**

- **ATPC Parameters in SU**
  - **ATPC Option**: To enable or disable the Automatic Transmit Power Control (ATPC) algorithm. The parameter takes effect immediately. However, when changed from Enable to Disable, the transmit power level shall remain at the last level determined by the ATPC algorithm before it was disabled. It will change to the value configured for the Transmit Power Control parameter only after the next reset.

    The default is **Enable.**
  - **ATPC Maximum Last Level Time After Reset**: The maximum time (in seconds) of attempting to associate with an AU after reset, using the last value of the ***Current Transmit Power Control***. If this time had elapsed without succeeding to associate with the AU, the unit will use the configured value of the ***Transmit Power Control*** parameter .

    Available values: 0-3600 (seconds)

    Default value: **30** (seconds)
  - **ATPC Maximum Last Level Time After Synchronization Loss**: The maximum time (in seconds) of attempting to associate with an AU after losing synchronization, using the last value of the ***Current Transmit Power Control***. If this time had elapsed without succeeding to associate with the AU, the unit will use the configured value of the ***Transmit Power Control*** parameter.

    Available values: 0-3600 (seconds)

    Default value: **120** (seconds)

Other Air Interface Parameters

- **Maximum Data Rate** – Displays the current maximum data rate, and allows entry of a new value for the maximum data rate.

  BreezeACCESS units operate at data rates of 3 Mbps, 2 Mbps, and 1 Mbps. Under certain conditions (compatibility reasons or range/speed trade-off), you may decide to limit the use of higher rates. If the quality of the link is not good enough, it is recommended to decrease the value of this parameter (the higher the data rate, the higher the error rate). Otherwise, there is a high probability that the unit will have to retransmit many frames several times before temporarily reducing the data rate (see ***Number of Retransmissions to Decrease Rate*** on page 2-82). A high number of retransmissions reduces the overall throughput for the selected SU as well as for all the other SUs served by the same AU. It is

recommended to also configure the ***Maximum Data Rate*** parameter when the Multi-Rate mechanism is enabled, to avoid unnecessary trials to transmit at higher rates when the probability of successful transmissions at these rates is low.

In the SU, the link quality can be estimated based on the RSSI measurement, using the assumption that the link is more or less symmetrical and that this value is a good indication to the level at which the SU is received by the AU. If the measured RSSI is less than a certain threshold, it is recommended to decrease the Maximum Data Rate of the SU in accordance with Table 2-13 (including a 3 dB safety margin). For best results it is recommended to acquire the RSSI results from the AU, indicating the level at which the AU receives transmissions from the specific SU (uplink RSSI), and to use this value for reaching a decision on the recommended Maximum Data Rate.

Allowed values are 1, 2, 3 Mbps.

The default value is **3 Mbps**.

Table 2-13: Recommended Maximum Data Rate

Maximum Data Rate	3Mbps	2Mbps	1Mbps
BreezeACCESS 5.7 GHz	RSSI>-67 dBm	-75 dBm<RSSI<-67 dBm	RSSI<-75 dBm
BreezeACCESS 5.2 GHz	RSSI>-73 dBm	-81 dBm<RSSI<-73 dBm	RSSI<-81 dBm

- **AU Transmission Rate Control (SU only)** – Enables the user to define whether the value of the Maximum Data Rate parameter influences the maximum rate of transmissions from the AU to this particular SU. In symmetrical links where it was determined that the Maximum Data Rate of the SU must be set to a value lower than 3 Mbps, it is recommended to also limit the maximum rate of transmissions from the AU by enabling this parameter.

  The default is **Disable.**

- **Acknowledge Delay Limit –** Enables the user to increase the range of the system through increasing the time that the unit can wait for a response message. This includes several scenarios where the unit expects a response message, such as handshaking during association process, an acknowledgement after transmitting a data frame and CTS after RTS. Increasing the range, however, may decrease the overall performance and achievable network throughput. It should be increased only to support ranges of over 10 km. If the range was increased for one SU, it must be increased to the same value for the AU.

  Valid values are: *Low* (up to 10 km), *Medium* (up to 20 km) and *High* (more than 20 km).

  The default setting is **Low** (up to 10 km).

- **Maximum Number of Associations** – Defines the upper limit for the number of Subscriber Units that can be associated with the AU, in order to guarantee the required quality of service to the customers.

  Valid values: 0-512.

  Default value: **512**.

NOTE:

There is no aging time for SUs. An SU will be removed from the list of associated SUs only upon occurrence of any of the following: (1) The AU received from another AU a SNAP frame with the SU MAC address indicating that the SU has become associated with the other AU, or (2) The AU has decided that the SU aged out following its failure to acknowledge a certain number of consecutive frames transmitted to it.

Thus, the database of associated SUs may include units that are no longer associated with the AU. If the number of associated SUs has reached the value of the ***Maximum Number of Associations*** parameter, additional SUs can not be served by this AU. To view the current number of associated SUs, use the ***Display Association Info*** option in the *MAC Address Database* menu. To delete entries of SUs that are no longer active, the AU must be reset.

- **WLAN Aging Time** (AU only)– Displays the current ***Call Aging Time*** parameter value and configures a new value. The AU maintains a Call Information database that includes listings of the SUs that are currently conducting a voice call. This database is used to determine the number of active voice calls that are managed by the AU at any given moment, allowing control of the number of simultaneous voice calls (see ***Maximum Voice Sessions*** parameters). In addition, the AU allocates prioritized channels to the voice (RTP) packets of SUs included in the Call Information database.

  The SU is deleted from the Call Information database once it sends a message that the call was terminated. Throughout the voice call, the SU periodically transmits keep-alive (re-association) messages approximately every ten minutes indicating that the call is still on. If such messages are not received for a period defined by the ***Call Aging Time*** parameter, the following will take place.

  a The AU deletes the SU listing from the Call Information database assuming that the call was improperly terminated (e.g. reset or loss of synchronization).

  b. For non-ACSE voice calls, a prioritized channel is no longer allocated to the voice packets (although voice packets will still get a relatively high priority).

  c. ACSE voice calls will be terminated (no slot will be allocated for the call).

  The allowed range for the Call Aging Time parameter is 1 (no aging) or 2-50,000 seconds. It is recommended to configure a call aging time of at least 1200 (20 minutes).

  The default value is **1800** seconds.

- **Maximum Voice Sessions –** Applicable only for an AU that provides services to Subscriber Units with voice capabilities. When the ACSE voice scheduler option is enabled, this parameter is not applicable and instead the ***Maximum ACSE Voice Sessions*** parameter is used. The value of the ***Maximum Voice Sessions*** parameter specifies the maximum number of simultaneous voice sessions that can be conducted by the SUs associated with this AU. If the number of active voice sessions reaches this number, any additional SU trying to initiate a voice session shall not get a dial tone. As this value increases, voice quality may deteriorate as more users share the same bandwidth for voice sessions.

  The selection range is from 0 to 50.

  The default value is **12**.

NOTE:

A voice session is defined as a voice connection between an SU and an AU. A session between two SUs that are served by the same AU is counted as two voice sessions.

- **Receive Attenuation Control** (SU-A/E units) – Displays the current attenuation introduced into the receiver circuits and allows entry of a different attenuation value.

  The available Receive Attenuation values are 0 dB (no attenuation), 10 dB and 25 dB. The effect of inserting such attenuation in the receive circuit is equivalent to reducing the level of the received signal (including both signal and noise) by 2 dB when selecting 10 dB attenuation and 12 dB when selecting 25 dB attenuation.

  The default is **0 dB**.

- **ACSE Parameters** – The ACSE (Adaptive Circuit Switched Emulation) Voice Scheduler is a proprietary enhanced air protocol that provides guaranteed delay and jitter properties for voice sessions by reserving specific time slots for each active telephone call. The ACSE Voice Scheduler allows the delivery of high quality voice, while maintaining the inherent efficiency of statistically multiplexed packet based networks. If the ACSE Voice Scheduler is enabled, an AU can support a higher number of good quality voice sessions. The ACSE Voice Scheduler feature does not affect voice sessions generated by external equipment and routed via the Ethernet port of the Subscriber Unit.

  - **ACSE Option –** Applicable only for an AU that provides services to Subscriber Units with voice capabilities. To enable/disable the ACSE Voice Scheduler protocol. The AU controls the operation of all the SUs it serves according to the configured ***ACSE Option***.

    The default is ***Disable***.

  - **Maximum ACSE Voice Sessions –** Applicable only for an AU that provides services to Subscriber Units with voice capabilities. When the ACSE voice scheduler option is disabled,

this parameter is not applicable and instead the ***Maximum Voice Sessions*** parameter (see page 2-63) is used. The value of the ***ACSE Maximum Voice Sessions*** parameter specifies the maximum number of simultaneous ACSE voice sessions that can be conducted by the SUs associated with this AU. If the number of active voice sessions reaches this number, any additional SU trying to initiate a voice session will not get a dial tone. As this value increases, voice quality may deteriorate as more users share the same bandwidth for voice sessions.

The selection range is from 0 to 21.

The default value is **21**.

NOTE:

A voice session is defined as a voice connection between an SU and an AU. A session between two SUs that are served by the same AU is counted as two voice sessions.

- **ACSE Number Of Retransmissions For Data –** The maximum number of times that a data packet that was not acknowledged will be retransmitted. When the ***ACSE Option*** is enabled, this parameter overrides the ***Number Of Retransmissions*** parameter (see page 2-82). This parameter has no effect when the ***ACSE Option*** is disabled. This parameter is applicable to all units in deployment where the ***ACSE Option*** is enabled, including units that do not support voice, since they are also affected by the use of the ACSE protocol.

  Valid values are from 0 (no retransmissions) to 100.

  The default value is **6**.

- **ACSE Number Of Retransmissions For Voice** (AU and SU with voice support) **–** The maximum number of times that a voice packet that was not acknowledged will be retransmitted. When the ACSE Option is enabled, this parameter overrides the ***Number Of Retransmissions*** parameter. This parameter has no effect when the ***ACSE Option*** is disabled.

  Valid values are from 0 (no retransmissions) to 100.

  The default value is **30**.

- **Show ACSE Parameters** – Displays the current settings of all ACSE parameters. The display in the SU includes the ***ACSE Option***, which is only configurable in the AU. It also includes the ACSE Dwell Time, which is set to 60 milliseconds.

- **Scanning Mode** (SU only) – Defines whether to use **Active** or **Passive** scanning. In active scanning, the SU transmits a Probe Request upon power-up. In passive scanning, the SU searches for a Beacon message from an AU prior to starting the authentication/association process. This parameter is not applicable if the **ACSE Option** is enabled, in which case passive scanning is always used.

The default is **Active**

NOTE:

When Best AU support is enabled, it is recommended to use Active Scanning. If passive scanning is used, the SU may not hear the best AU (or the preferred AU). The higher the number of hopping channels, the higher the probability that the SU will not hear the best (or preferred) AU when passive scanning is used.

- **MAC Address Black List** (AU only) - Enables to define units that are not authorized to receive services. The AU will not provide services to a unit whose MAC Address is included in the black list. This feature enables to disconnect units from the services in cases such as when the user had fraudulently succeeded to configure the unit to values different than his subscription plan. The black list can include up to 100 MAC Addresses.
  - **Add MAC Address to Black List** - To add a MAC Address to the Black List.
  - **Remove MAC Address from Black List** - To remove a MAC Address from the Black List.
  - **Show MAC Address Black List** - To display the current list of MAC Addresses included in the black list.
- **Wireless Trap Threshold** - Enables to define the threshold for the wireless quality traps: The **brzaccAUWirelessQualityTRAP** or the **brzaccSUWirelessQualityTRAP** indicate that the quality of the wireless link has gone below or above the specified threshold.

  For AU the threshold is in percents of retransmissions. For SU the threshold is in RSSI units, indicating the quality of the received signal. Appendix D provides information on RSSI to dBm conversion.

- **Send Roaming SNAP (SU- only, except to SU-BD and SU-BD1V)** - This feature is applicable only to mobile units that can roam among AUs. The feature enables fast distribution of the new location for all clients that are behind the SU.

  When enabled, the SU will send multicast SNAP messages via the wireless link each time it associates with an AU, except to the first association after reset. The SU will send one SNAP message for each client learned on its Ethernet port, based on its bridging table. In the SNAP message the clients' MAC address is used as the source address. The AU that receives this SNAP message learns from it the new location of the clients. It forwards the SNAP to other AUs and Layer-2 networking equipment via its Ethernet port, to facilitate uninterrupted connectivity and correct routing of transmissions to these clients. The new AU as well as the previous AU with which the SU was associated, will forward the SNAP messages to all other SUs associated with them.

The default selection is **Disable**.

Network Management Parameters (AU, SU and GU)

This feature allows protecting the unit from trials of unauthorized access by defining a set of IP addresses from which management of the unit (Telnet, TFTP, SNMP, ICMP) is allowed (excluding transmission of messages generated in the unit such as Traps or Ping Test frames). This feature also supports the possibility of defining the direction (from the wireless media or from the wired Ethernet or from both) from which such access is allowed. In addition, this menu enables configuring SNMP Traps sending parameters. The *Network Management Parameters* menu includes the following options:

- **Access to Network Management –** Defines the port through which the unit can be managed. The options are the following:
  - **From Wlan Only**
  - **From Ethernet Only**
  - **From Both Ethernet & WLAN**

  The default selection is **From Both Ethernet & Wlan**.

NOTE:

The ***Access to Network Management*** option is not available in the GU, as this module does not have a wireless link interface.

- **Network Management Filtering –** Enables/disables management filtering. If management filtering is enabled, the unit can only be managed by stations whose IP addresses match one of the entries in the ***Set Network Management IP Addresses*** (see next parameter) that are connected to the unit via the defined port(s). Available options are:
  - **Disable** – No IP address based filtering
  - **Activate Management IP Filter On Ethernet Port** – Applicable only if the ***Access to Network Management*** parameter is configured to either **From Ethernet Only** or **From Both Ethernet & Wireless Link**. The unit can be managed from the Ethernet port only by stations whose IP addresses match one of the entries in the Set Network Management IP Addresses list. If the ***Access to Network Management*** parameter is configured to **From Both Ethernet & Wireless Link,** than there is no IP address based filtering on the wireless port.
  - **Activate Management IP Filter On Wlan Port** – Applicable only if the ***Access to Network Management*** parameter is configured to either **From Wireless Link Only** or **From Both Ethernet & Wireless Link**. The unit can be managed from the wireless link port only by stations whose IP addresses match one of the

entries in the Set Network Management IP Addresses list. If the ***Access to Network Management*** parameter is configured to **From Both Ethernet & Wireless Link**, then there is no IP-address-based filtering on the Ethernet port.

- **Activate Management IP Filter On Both Ethernet & Wlan Ports** – Applicable with all options of the ***Access to Network Management*** parameter. The unit can be managed from the port(s) defined by the selected option of the ***Access to Network Management*** parameter only by stations whose IP addresses match one of the entries in the Set Network Management IP Addresses list.

NOTE:

In the GU only the **Disable** and **Activate** Management IP Filtering on Ethernet Port options are available.

The default selection is **Disable**.

- **Set Network Management IP Addresses** – Displays the IP addresses of the stations that can manage the unit (if ***Network Management Filtering*** option was enabled) and allows you to enter new addresses; up to three IP addresses can be defined.

  The default value is **0.0.0.0** for all 3 addresses.

- **Delete a Network Management IP Address –** Deletes one of the 3 IP address entries from the list of Network Management IP Addresses.

- **Delete All Network Management IP Addresses** – Deletes all entries from the list of Network Management IP Addresses.

- **SNMP Traps** – This submenu enables configuring SNMP Traps sending parameters. It includes the following options:

  - **Traps Control** - Enables/disables transmission of SNMP traps;

    - **Send SNMP Traps –** Enables/disables sending of SNMP traps. Available options are:
      - **Enable Traps Sending -** enables sending of SNMP Traps. The Traps that will be sent can be defined by the **Per Trap Control** menu. The addresses to which these traps will be sent and the SNMP Communities associated with these Traps are defined by the **SNMP Traps IP Destination** and the **SNMP Traps Community** options.
      - **Disable Traps Sending** - no SNMP Traps will be sent by the unit.

      The default selection is **Disable Traps Sending**.

    - **Per Trap Control** - When **SNMP Traps Sending** is enabled, this menu allows defining for each individual Trap whether it will be transmitted or not. The Traps that can be controlled and the default option for each Trap are detailed in Table 2-14.

Table 2-14: Per Trap Control

Trap	Unit	Default
Send SU Associated AU Trap	AU	Enable Trap Sending
Send Disassociated Trap	AU	Enable Trap Sending
Send AU Aging Trap	AU	Enable Trap Sending
Send AU Wireless Quality Trap	AU	Enable Trap Sending
Send SU Associated Trap	SU	Enable Trap Sending
Send SU Wireless Quality Trap	SU	Enable Trap Sending
Send Parameter Changed Trap	AU, SU	Enable Trap Sending
Send GPS Alarm In Trap	GU	Enable Trap Sending
Send GPS Alarm Out Trap	GU	Enable Trap Sending
Send UTC Status Trap	GU	Enable Trap Sending
Send Power Up From Reset Trap	All	AU, GU: Enable Trap Sending SU: Disable Trap Sending
Send Monitor Status Trap	All	Enable Trap Sending
Send Cold \ Warm Start Trap	All	AU, GU: Enable Trap Sending SU: Disable Trap Sending
Send AU Loss Of Sync Trap	BS-AU in slave mode	Enable Trap Sending
Send AU Alarms Traps	IF-based AU	Enable Traps Sending (applicable to all AU Alarms Traps)

- **SNMP Traps IP Destination –** Displays the current values of 3 IP addresses that are defined as the trap destinations. Allows entering a new address for each of the 3 entries.
  - The default of all three SNMP Traps IP Destinations is **0.0.0.0**.
- **SNMP Traps Community –** Defines a new community string for each of the 3 SNMP Trap IP Destination entries.
  - Valid strings: Up to 14 ASCII characters, case sensitive.
  - The default for all 3 entries is **public** (read-only).
- **Delete One Trap Address** - Deletes one of the 3 IP address entries from the list of SNMP Traps IP Destinations.
- **Delete All Traps Addresses** - Deletes all entries from the list of SNMP Traps IP Destinations.
- **Show SNMP Traps Parameters –** Displays the current values of the SNMP Traps parameters.

- **Show Network Management Parameters –** Displays the current values of the Network Management parameters.

Bridge Parameters (AU, SU and GU)

The *Bridge Parameters* sub-menu includes the following parameters sets:

- Virtual LAN (VLAN) parameters
- ToS parameters
- Ethernet Broadcast Filtering parameters
- Other Bridging parameters
- Ports Control Parameters

VLAN Parameters

- **VLAN Support** – Defines the parameters that are related to the VLAN-aware (Virtual LAN-aware) feature of BreezeACCESS units. Each VLAN includes stations that can communicate with each other, but cannot communicate with stations belonging to different VLANs. The VLAN also provides the ability to set traffic priorities for transmission of certain frames. The information related to the VLAN is included in the VLAN Tag Header, which is inserted in each frame between the MAC header and the data. VLAN implementation in BreezeACCESS units supports frames routing by port information (i.e. each port is connected to only one VLAN).

  The ***VLAN Support*** option allows viewing and setting of the following parameters:

  - **VLAN ID-Data** (SU unit only) **–** Applicable for Access links only. Sets the VLAN ID for data frames, identifying the VLAN to which the unit belongs.
    - Valid values: 1 to 4094.
    - Default value: **1.**
    - Frames received from the Wireless link port:
      - Only tagged frames with VLAN ID (VID) value equal to the VLAN ID Data defined in the unit are forwarded to the Ethernet port.
      - The tag headers are removed from the data frames received from the wireless link prior to transmitting them on the Ethernet port.

      Frames received from the Ethernet port:
      - A VLAN data tag is inserted in all untagged frames received from the Ethernet port before transmission on the wireless link. The tag includes the values of the VLAN ID – Data and the VLAN Priority – Data parameters.
      - Tagged frames received on Ethernet port which are designed to be forwarded to the Wireless link port are discarded (including frames with priority tag for prioritization purpose only).

- **VLAN ID-Management** (AU, SU without voice and GU) – Applicable for all link types. Sets the VLAN ID for management frames, identifying remote stations for management purposes. This applies to all management applications using protocols such as SNMP, TFTP, ICMP (ping) and Telnet. All the servers/stations using these protocols must tag the management frames they send to the unit with the value of the VLAN ID – Management parameter.

  Valid values: 1 to 4094 or 65535 (No VLAN).

  Default value: **65535**.

  If VLAN ID – Management is other than 65535:
  - Only tagged management frames with matching VLAN ID received on either the Ethernet or wireless link ports are forwarded to the unit.
  - A VLAN Management Tag is inserted in all management frames generated by the unit before transmission on either the Ethernet or wireless link port. The tag includes the values of the VLAN ID – Management and the VLAN Priority – Management parameters.

  If VLAN ID – Management is 65535 (No VLAN):
  - Only untagged management frames received on either Ethernet or wireless link ports are forwarded to the unit.
  - Management frames generated by the unit will not be tagged.

  The following table summarizes the functionality of the internal management port in accordance with the value of the ***VLAN ID – Management*** parameter. The table is valid for all link types.

Table 2-15: Management Port Functionality – AU, SU without Voice Support and GU

Action	Management Port – internal (SU)
Receive from Ethernet	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Receive from Wireless (AU and SU)	Tagged frames, matching VID-M Untagged frames when VID-M=65535
Transmit	Tag Insert VID-M, PID-M

Legend: VID-M: VLAN ID-Management

PID-M: VLAN Priority-Management

- **VLAN ID-Voice & Management** (SU with voice support only) – Applicable for all link types. Sets the VLAN ID for voice and management frames, identifying remote stations for voice communication and management purposes. This applies to all units that support the H.323 protocol and to management applications using protocols such SNMP, TFTP, ICMP (Ping) and

Telnet. All the servers/stations using these protocols must tag the frames they send to the unit with the value of the ***VLAN ID - Voice & Management*** parameter.

Valid values: 1 to 4094 or 65535 (No VLAN).

Default value: **65535**.

If ***VLAN ID –Voice & Management*** is other than 65535:

- Only tagged management frames with matching VLAN ID received on either the Ethernet or wireless link ports are forwarded to the unit.
- A VLAN Management Tag is inserted in all management frames generated by the unit before transmission on either the Ethernet or wireless link port. The tag includes the values of the ***VLAN ID – Voice & Management*** and the ***VLAN Priority – Management*** parameters.
- A VLAN Voice Tag is inserted in all voice frames (RTP packets) generated by the unit before transmission to the Wireless or Ethernet port. The tag includes the values of the ***VLAN ID – Voice & Management*** and the ***VLAN Priority – Voice*** parameters.

If ***VLAN ID – Voice & Management*** is 65535 (No VLAN):

- Only untagged management frames received on either Ethernet or wireless link ports are forwarded to the unit.
- Management frames generated by the unit will not be tagged.
- If the ***Voice Priority Tag*** Option is enabled, a VLAN Priority Tag is inserted in all voice frames (RTP packets) generated by the unit before transmission to the Wireless or Ethernet port. The tag includes a VID value of zero and the ***VLAN Priority – Voice*** parameter.

The following table summarizes the functionality of the internal management and voice ports in accordance with the value of the ***VLAN ID – Voice & Management*** parameter. The table is valid for all link types. See VLAN Link type – Access Link and Trunk Link for some restrictions when configuring this parameter.

Table 2-16: Management and Voice Ports Functionality – SU with Voice Support

Action	Management Port – internal (SU)	Voice RTP Port – internal (SU with Voice)
Receive from Ethernet	Tagged frames, matching VID-M Untagged frames when VID-M=65535	Not applicable
Receive from Wireless	Tagged frames, matching VID-M Untagged frames when VID-M=65535	Tagged frames, matching VID-M Untagged frames when VID-M=65535

Transmit	Tag Insert VID-M, PID-M	If VID-M = 65535 and Voice Priority Tag option are enabled, Tag insert VID=0, PID-V. If VID-M not equal to 65535, insert VID-M and PID-V

Legend: VID-M: VLAN ID - Voice and Management

PID-M: VLAN Priority-Management

PID-V: VLAN Priority-Voice

- **VLAN Link Type** (AU and SU) – Defines the link type, which actually defines the functionality of the VLAN-aware capability of the unit.

  Available options are: Hybrid Link, Trunk Link and Access Link (Access Link is available only in SUs).

  - The default selection is **Hybrid Link**.
  - **Access Link** (SU only) – Transfers frames while tagging/untagging them because all devices connected to it are VLAN-unaware. Thus, the unit cannot transfer tagged frames.

    The following table summarizes the functionality of the data port for an access link.

Table 2-17: VLAN Data Port Functionality Summary – Access Link

Action	Data Port (SU)
Accept from Ethernet	Untagged frames
Accept from Wireless	Tagged frames, matching VID-D
Tag Insert	VID-D, PID-D (to wireless)
Tag Remove	Yes (to Ethernet)

Legend: VID-D: VLAN ID-Data

PID-D: VLAN Priority-Data

- **Trunk Link –** Transfers only tagged frames, because all devices connected to it are VLAN-aware:

  Only tagged data frames received on Ethernet or wireless link ports are forwarded.

WARNING:

It is not recommended to configure a unit as a Trunk Link with VLAN ID - Management (or VLAN ID - Voice & Management) of 65535, as it will not forward any 'NO VLAN' management frames to its other port. It will be impossible to manage devices connected behind the unit that are also configured with 'NO VLAN'.

If the VLAN Forwarding option is enabled, a received data frame with a VLAN ID that is not a member of the unit's VLAN Forwarding List will be discarded.

NOTE:

If VLAN Forwarding is enabled, make sure to include in the Forwarding List the VLAN ID – Management (or VLAN ID - Voice & Management) of all units that should be managed via the wireless port of the unit.

If the VLAN Relaying option is enabled in an AU, a WLAN relayed data frame with a VLAN ID that is not a member of the unit's VLAN Relaying List will be discarded.

NOTE:

If VLAN Relaying is enabled and you manage your devices from behind an SU unit, make sure to include in the Relaying List the VLAN ID – Management (or VLAN ID - Management & Voice) of all units that should be managed when relaying via the wireless port of the AU unit. If also VLAN Forwarding is enabled in the AU, these VLAN IDs should also be included in the Forwarding List.

The following table summarizes the functionality of the data port for a Trunk link.

Table 2-18: VLAN Data Port Functionality Summary – Trunk Link

Action	Data Port (SU and AU)
Accept from Ethernet	Tagged frames. If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding list are forwarded.
Accept from Wireless	Tagged frames. If Forwarding is enabled, only frames with VLAN ID values which are included in the Forwarding list are forwarded.
Tag Insert	No
Tag Remove	No

- **Hybrid Link** – Transfers both tagged and untagged frames, since the devices connected to it can be either VLAN-aware or VLAN-unaware. This is equivalent to defining no VLAN support, as the unit is transparent to VLAN.

  The following table summarizes the functionality of the data port for a Hybrid link:

Table 2-19: VLAN Data Port Functionality Summary– Hybrid Link

Action	Data Port (SU and AU)
Accept from Ethernet	All
Accept from Wireless	All
Tag Insert	No
Tag Remove	No

- **Voice Priority Tag Option** (SU with voice support only) –. Supports priority for voice frames (RTP packets) in units with VLAN ID – Management & Voice of 65535 (No VLAN). If enabled, a Priority Tag that includes the value of the VLAN Priority – Voice parameter and a zero value in the VID field will be inserted into all voice frames (RTP packets) generated by the unit before transmission to the Wireless or Ethernet port.

  Valid selections are: Enable and Disable.

  Default selection is **Disable**.

- **VLAN Forwarding** (AU and SU)– Applicable for trunk link only. Defines the VLAN ID values that will be included in the VLAN Forwarding List. If the ***VLAN Link Type*** is defined as a Trunk Link and the ***VLAN Forwarding*** option is enabled, a received data frame with a VLAN ID that is not a member of the unit's VLAN Forwarding List will be discarded. The ***VLAN Forwarding*** parameter provides the following options:

- **VLAN Forwarding Support** – Enables or disables the VLAN Forwarding feature.

  Available selections are Disable and Enable.

  The default selection is **Disable**.

- **Add Forwarding VLAN ID** – Adds a VLAN ID to the VLAN Forwarding List. One VLAN ID can be entered each time. The maximum number of VLAN IDs in the VLAN Forwarding List is 20.

  Valid values are 1 to 4094.

- **Remove Forwarding VLAN ID** – Removes a VLAN ID from the VLAN ID Forwarding List.

  Valid values are VID values (from 1 to 4094) that are included in the VLAN Forwarding List.

- **Show VLAN ID Forwarding List** – Displays the values of the VLAN IDs that are included in the VLAN Forwarding List.

NOTE:

If the VLAN ID Forwarding List is empty and the VLAN Forwarding Support is enabled, then all data frames will be discarded.

❖ **VLAN Relaying** (AU only) – Applicable for Trunk link only. Defines the VLAN ID values that will be included in the VLAN Relaying List. If the Link Type is defined as Trunk Link and the VLAN Relaying option is enabled, a received wireless link relayed frame (a frame received from the wireless link that should be transmitted back through the wireless link) with a VLAN ID that is not a member of the unit's VLAN Relaying List, will be discarded. If VLAN Forwarding Support is also enabled, it is necessary to configure all the VLAN IDs in the Relaying List also in the Forwarding List to enable the relaying operation.

The VLAN Relaying menu provides the following options:

- **VLAN Relaying Support** – Enables or disables the VLAN Relaying feature.

  Available selections are Disable and Enable.

  The default selection is **Disable**.

- **Add Relaying VLAN ID** – Adds a VLAN ID to the VLAN Relaying List. One VLAN ID can be entered each time.

  The maximum number of VLAN IDs in the VLAN Relaying List is 20.

  Valid values are 1 to 4094.

- **Remove Relaying VLAN ID** – Removes a VLAN ID from the VLAN ID Relaying List.

  Valid values are VID values (from 1 to 4094) that are included in the VLAN Relaying List.

- **Show VLAN ID Relaying List** – Displays the values of the VLAN IDs that are included in the VLAN Relaying List.

NOTE:

If the VLAN ID Relaying List is empty and the VLAN Relaying Support is enabled, then all wireless link relayed data frames will be discarded.

If the VLAN ID Relaying List and Forwarding List Support are both enabled, all the VLAN IDs configured in the Relaying List must also be configured in the Forwarding List.

❖ **VLAN Traffic Priority** (AU and SU) – Each packet to be transmitted to the wireless link is transferred to one of three queues: Low, Mid and High. Packets in the High queue have the highest priority for transmission, and those in the Low queue have the lowest priority.

BreezeACCESS Subscriber and Access Units support Layer 2 traffic prioritization based on the IEEE 802.1p standard. The priority field in the 802.1Q header tag can have a value in the range 0-7. This value determines the relative priority of the packet.

Tagged frames that are received from the Ethernet port and have a Priority higher than the value of the VLAN Priority Threshold will be routed to the Mid queue.

As the system also supports Layer 3 prioritization based on ToS, packets with precedence in the ToS field that is higher than the value of the ToS Precedence Threshold parameter will also be routed to the Mid queue (applicable to both tagged and untagged frames).

All other packets received from the Ethernet port will be routed to the Low queue.

Voice frames (RTP packets) generated by SUs with voice support as well as control and wireless management frames that are generated in the unit will be routed to the High queue.

Management frames from a station behind a Subscriber Unit that are intended to reach another BreezeACCESS unit, are not recognized as management frames by the Subscriber Unit connected to the originating station. Therefore, any frame coming from the Ethernet port which is designated to reach another BreezeACCESS unit via the wireless port will be sent to the High queue, regardless of the configured Priority options.

The *VLAN Traffic Priority* menu allows viewing and setting the following parameters:

- **VLAN Priority – Data** (SU only) – Applicable for Access link only. Displays and sets the value of the VLAN Priority field for data frames that are transmitted to the wireless link. All data frames are routed to the Low queue. This parameter will only impact the way that other VLAN-aware devices will handle the packet.

Valid values are 0-7.

The default value is **0**.

NOTE:

Packets Received from the Ethernet port with a ToS Precedence value higher than the ToS Precedence Threshold defined will be routed to the Mid queue.

- **VLAN Priority – Management** (AU, SU and GU)– Displays and sets the value of the VLAN Priority field for management frames in units with a VLAN ID- Management (or VLAN ID – Management & Voice) value other than 65535. In the unit all management frames are routed to the High queue. This parameter only impacts the way that other VLAN-aware devices will handle the packet.

  Valid values are 0-7.

  The default value is **4** for SU units with voice support and **0** for all other units.

- **VLAN Priority – Voice** (SU with voice support only) – Applicable for all link types. Displays and sets the value of the VLAN Priority field for voice frames (RTP packets). In the unit all voice frames (RTP packets) are routed to the High queue. This parameter only impacts the way that other VLAN-aware devices will handle the packet. In units with VLAN ID – Voice & Management of 65535 (No VLAN), if the Voice Priority Tag Option enabled, then a Priority Tag that includes the value of the VLAN Priority – Voice parameter and a zero value in the VID field will be inserted into all voice frames (RTP packets) generated by the unit before transmission to the Wireless or Ethernet port.

  Valid values are 0-7.

  The default value is **6**.

- **VLAN Priority Threshold** (AU and SU) – Applicable for trunk and hybrid links only. Displays and defines the value of the VLAN Priority Threshold. This parameter impacts the way that the unit will handle tagged packets that are received from the Ethernet port.

  Since the system supports both Layer 2 and Layer 3 prioritization, a frame will be routed to the Mid queue if one of the following conditions is met:

  a. The precedence in the ToS field is higher than the value of the ToS Precedence Threshold parameter (applicable to both tagged and untagged frames).

  b. The VLAN Priority field in a tagged frame is higher than the value of the VLAN Priority Threshold parameter.

  Valid values are 0-7.

The default value is **4**.

- **Show VLAN Parameters –** Displays the current values of the VLAN Support parameters.

ToS Priority Parameters (AU and SU)

- **ToS Priority** – To set voice priority parameters to support end-to-end IPv4 Type of Service (ToS) Layer 3 prioritization according to RFC 791. The ToS Priority menu includes the following parameters:
  - **Voice Packets ToS** (SU with voice support only) – Sets the value of the Type of Service (ToS) field in the IP header of voice frames (RTP packets). If the router/gateway in the base stations supports quality of service based on IPv4 ToS, the value of this parameter should be configured according to the definitions of the router/gateway in order to take advantage of the QoS feature and to ensure that voice packets will be handled accordingly.
    - Valid values are 0-255.
    - The default value is **0**.
  - **ToS Precedence Threshold** (AU and SU) – ToS based prioritization is in accordance with the precedence bits of the ToS field in the IP header. An IP packet received from the Ethernet port will be routed to the Mid queue if one of the following conditions is met:

    a The precedence in the ToS field is higher than the value of the ToS Precedence Threshold parameter (applicable to both tagged and untagged frames).

    b The VLAN Priority field in a tagged frame (hybrid or trunk link) is higher than the value of the VLAN Priority Threshold parameter.

    All other packets received from the Ethernet port will be routed to the Low queue.

    Valid values are 0 to 7.

    The default value is **3**.

Ethernet Broadcast Filtering (SU only)

Allows defining the Layer 2 (Ethernet) broadcast and multicast filtering capability. The Ethernet Broadcast Filtering allows enhancing the security of the system and saving bandwidth on the wireless media through blocking protocols that are typically used in the customer's LAN but are not relevant for other customers (e.g. NetBios that is used by Microsoft Network Neighborhood). Enabling this feature blocks Ethernet broadcasts and multicasts (the I/G bit at the destination address is set to 1).

The *Ethernet Broadcasting Filtering* menu allows viewing and setting the following parameters:

- **Filter Options** – Defines the Ethernet broadcast filtering functionality of the unit. The following options are available:
  - **Disable**: No Ethernet broadcast filtering
  - **From Ethernet Only**: Filter broadcast messages received from the Ethernet port
  - **From WLAN Only**: Filter broadcast messages received from the wireless link port
  - **Both From Ethernet & WLAN**: Filter broadcast messages received from both the Ethernet port and the wireless link port

  The default selection is **Disable**.
- **DHCP Broadcast Override Filter** – Enables broadcasting of DHCP (Dynamic Host Configuration Protocol) messages. This is independent of the filtering option selected in ***Filter Options*** above, meaning that even if according to the selected filtering option, broadcast messages should be filtered, DHCP broadcasts will be transmitted if the ***Enable DHCP Broadcast*** option is selected. Available selections are:
  - **Disable–** DHCP Broadcast messages will be filtered or transmitted according to the general filtering criteria set by the selected value of the ***Filter Options*** parameter.
  - **Enable–** DHCP Broadcast messages will be transmitted regardless of the selected value of the ***Filter Options*** parameter.

  The default selection is **Disable**.
- **PPPoE Broadcast Override Filter** – Enables broadcasting of PPPoE (Point-to-Point Protocol over Ethernet) messages. This is independent of the filtering option selected in ***Filter Options*** above, meaning that even if according to the selected filtering option broadcast messages should be filtered, PPPoE broadcasts are transmitted if the ***Enable PPPoE Broadcast*** option is selected.

  Available selections are:
  - **Disable–** PPPoE Broadcast messages is filtered or transmitted according to the general filtering criteria set by the selected value of the ***Filter Options*** parameter.
  - **Enable–** PPPoE Broadcast messages is transmitted regardless of the selected value of the ***Filter Options*** parameter.

  The default selection is **Disable**.
- **ARP Broadcast Override Filter** –When this option is set to Enable ARP Broadcast, broadcasting of ARP messages is independent of the filtering option selected in ***Filter Options*** above. This means that ARP broadcasts are transmitted regardless of which filtering option is selected for broadcast messages.

  Available selections are:

- **Disable–** ARP Broadcast messages are filtered or transmitted according to the general filtering criteria set by the ***Filter Options*** parameter.
- **Enable–** ARP Broadcast messages are transmitted regardless of the selected value of the ***Filter Options*** parameter**.**

The default selection is **Enable**.

Other Bridging Parameters

- **LAN to Wireless Link Bridging Mode** (AU only) – Controls the flow of information from the Ethernet backbone to the wireless media. The options are:
  - **Reject Unknown** – Allows transmission of packets only to addresses that the AU knows to exist in the wireless link.
  - **Forward Unknown –** Allows transmission of all packets, except those sent to addresses that the AU recognizes as being on its wired Ethernet side.

  The default selection is **Forward Unknown**.
- **Bridge Aging Time** (AU and SU) – Displays the current value for bridge aging time for learned addresses of devices on both the wired and wireless sides (not including BreezeACCESS units), and allows entry of a new value.

  The available range is 100 to 2000 seconds.

  The default value is **300** seconds for AUs and for SUs with bridge functionality (SU-BD and SU-BD1V). For all other SUs it is **1800** seconds.
- **Broadcast Relaying** (AU only) – Determines whether the unit performs broadcast relaying. When ***Broadcast Relaying*** is enabled, broadcast packets originating in devices on the wireless link are transmitted by the AU back to the wireless link devices, as well as to the wired LAN. If disabled, these packets are sent only to the local wired LAN and are not sent back to the wireless link. Disable ***Broadcast Relaying*** if you are sure that all broadcast messages from the wireless link will be destined to the wired LAN.

  The default selection is **Enable**.
- **Unicast Relaying** (AU only) – Determines whether the unit performs Unicast relaying. When ***Unicast Relaying*** is enabled, Unicast packets originating in devices on the wireless link can be transmitted back to the wireless link devices. If this parameter is disabled, these packets are not sent to the wireless link even if they are intended for devices on the wireless link. Disable ***Unicast Relaying*** only if you know that all unicast messages from the wireless link will be destined to the local wired LAN.

  The default selection is **Enable**.

- **Ports Control** (SU only) - To enable/disable the Ethernet and/or Voice port. The Ports Control submenu includes the following options:
  - **Ethernet Port Control** - To enable/disable non-management traffic to/from the Ethernet port. All current data sessions will be terminated. The unit may still be managed via the Ethernet port even when it is disabled for data traffic.

    The default selection is **Enable**.
  - **Voice Port Control** (SU with voice support) - To enable/disable the voice port. When the voice port it disabled, there will not be a dial tone. An existing connection will be terminated.

    The default selection is **Enable**.
- **Show Bridge Parameters** – Displays the current values of the Bridge parameters.

Performance Parameters (AU and SU)

The *Performance Parameters* menu includes the following parameters:

- **RTS Threshold –** Defines the minimal frame size to require RTS/CTS (Request To Send/Clear To Send) handshake. Frames with a size below the RTS Threshold value are transmitted directly to the wireless link without being preceded with RTS frames. Setting this parameter to a value larger than the maximum frame size will prevent the RTS/CTS handshake for frames transmitted by this unit.

  The allowed range is from 20 to 1600.

  The default value is **60 bytes** for SUs and **1600** for AUs. Using a value of 1600 for the AU ensures that it will never use the RTS/CTS mechanism.

- **Number of Retransmissions** – The maximum number of times that a packet that was not acknowledged will be retransmitted. This parameter is not applicable when the ***ACSE Option*** is enabled.

  Valid values are from 0 (no retransmissions) to 100.

  The default value is **1**.

- **Number of Dwells to Retransmit –** The minimum number of dwell periods during which packets will be retransmitted. The ***Number of Dwells to Retransmit*** parameter is used together with the ***Number of Retransmissions*** parameter (see above) to spread the retransmissions in both the time and frequency domains.

  Valid values are from 0 to 9.

  The default value is **2**.

NOTE:

The **Number of Dwells to Retransmit** is not applicable to ACSE voice frames since voice is sensitive to delay. All ACSE voice frames will be retransmitted within the same dwell, up to the maximum number of retransmissions allowed as defined by the **ACSE Number Of Retransmissions For Voice** parameter.

- **Number of Retransmissions to Decrease Rate** – The number of unsuccessful retransmissions that will cause an automatic decrease in the data rate before the next retransmission (the lower the data rate, the higher the probability that the packet will be properly received and acknowledged). The count is reset each time the rate is reduced, meaning that at each rate the maximum number of transmission attempts equals the value of this parameter plus 1.

  Valid values are from 0 to 10.

  The default value is **0**, meaning that the rate will be decreased immediately following an unsuccessful transmission attempt at the current rate.

- **Minimum Contention Window** – The BreezeACCESS system uses a special mechanism based on detecting the presence of a carrier signal (Carrier Sense Multiple Access-CSMA) and analyzing the information contained in the transmissions of the AU to estimate the activity of other SUs served by the same AU. The target is to minimize collisions in the wireless media resulting from trials of more than one unit to transmit at the same time. The contention window is the time that a unit will wait from the time it has decided that there are no transmissions by other units until it will attempt to transmit. The contention window is a random number whose maximum value is determined by the value of the ***Minimum Contention Window*** parameter and the number of previous trials to transmit the frame. The higher the number of SUs served by the same AU, the higher the Minimum Contention Window for each SU should be.

  The Valid values are from 7 to 255.

  The default value is **31**.

- **Carrier Sense Level** – This is the threshold level that is used prior to initiating a transmission by the unit to determine the existence of transmission from another unit. As long as the level of a received signal is above this threshold, the unit will assume that another unit is transmitting and will refrain from trying to transmit in order to prevent collisions.

  Available values: -100 to -40 (dBm)

  The default value is **-85** dBm for products operating in the 5.7 GHz band, and **-90** dBm for products operating in the 5.2 GHz band.

- **Maximum Multicast Rate** (AU only)– Determines the maximum rate of multicast and broadcast transmissions. Multicast and broadcast transmissions are not acknowledged; therefore there is a chance that such transmissions will not be properly received without the possibility of using the acknowledgement mechanism for retransmission. Therefore, it is recommended to use a lower rate for transmission of broadcast, multicast and control frames, to increase the probability that they will be received without errors.

  The available selections are 1, 2, and 3 Mbps.

  The default is the minimum possible rate, **1Mbps**.

- **Multi-Rate –** Link quality dynamically changes, due to various environmental conditions. Dynamically switching between the possible transmission rates increases the probability of using the maximum rate for the current radio link quality at any given moment. Decreasing the rate one step improves the receiver sensitivity by 6-8dB. When enabled, the transmission rate decisions are made separately for each unit. This algorithm is completely separated from the retransmission mechanism defined by ***Number of Retransmission*** and ***Number of Dwells to Retransmit*** parameters. The algorithm provides Access Units with simultaneous, adaptive support for multiple Subscriber Units at

different rates. The decision on the rate of each transmission (first attempt) is based on counting transmissions, retransmissions and *successful windows*. A *window* is defined as N consecutive transmission or retransmission attempts, defined by the *Multi-Rate Decision Window Size* parameter. A *successful window* is a *window* in which the number of failed transmissions is not higher than a defined threshold. A transmission is defined as failed if an ACK was not received after the first transmission of a frame. If the current rate is lower than the maximum available rate, the transmission rate will be increased to the next available rate following a number of successful windows. In order to minimize fluctuations, the number of successful windows at a certain rate required to reach a decision to increase the rate depends on previous rate of unsuccessful windows at the higher rate. The higher the rate of previous unsuccessful windows at a specific rate, the higher is the number of required consecutive successful windows at the lower rate prior to increasing the rate. If the current rate is higher than the minimum available rate (1 Mbps), the transmission rate will be decreased to the next available rate following a failed window. The *Multi-Rate* menu includes the following parameters:

- **Multi-Rate Support** – Enables or disables the Multi-Rate decision algorithm. When enabled, the algorithm supports increase/decrease of transmission rates in the range from 1 Mbps to the current value of the ***Maximum Data Rate*** parameter. (Enabling the algorithm has no effect if the Maximum Data Rate is 1 Mbps).

  The default selection is **Enable**.

- **Multi-Rate Decision Window Size** – Sets the size of the decision window. The size of a window is measured as the number of consecutive transmission or retransmission attempts. Increasing the size of the window will increase the probability that it will be a *successful window*, thus slowing down the decision to degrade to a lower rate and accelerating the decision to upgrade to a higher rate.

  Valid values are from 1 to 50.

  The default value is **12**.

- **Number of Failures in Multi-Rate Decision Window** – Sets the maximum number of failures allowed in a decision window. A window is defined as successful only if the number of failures is not higher than this number. A transmission attempt is defined as a failure if an ACK was not received upon the first transmission attempt. Increasing the value of this parameter will increase the probability that it will be a *successful window*, thus slowing down the decision to degrade to a lower rate and accelerating the decision to upgrade to a higher rate.

  Valid value: 1 to Multi-Rate Decision Window Size.

  Default value: **8**.

- **Dwell Time (AU only) –** The time spent on a radio channel before hopping to the next channel according to the operational hopping sequence.

  The allowed selections are 32, 64 and 128 Kilo-microseconds.

  The default value is **128** Kilo-microseconds.

  When the ***ACSE Option*** is enabled this parameter is not applicable and the dwell time is the ACSE Dwell Time, set to a fixed value of 60 milliseconds.

- **Interference Avoidance Parameters:** These parameters enable to define the interference avoidance algorithm. The algorithm is designed to minimize the probability of the modem identifying interference as a possible desired signal. Such an occurrence should be avoided, as locking on the interfering signal may disable the modem from timely identifying the appearance of a desired signal.

  Setting a certain level as a threshold below which signal are considered as interference is not sufficient, since the energy in the relevant spectrum of interfering signals may temporarily be well above the threshold level. On the other hand, setting the threshold at a higher level to overcome the effect of temporary occurrences of high-level interferences is not a good solution, as it may cause the unit to reject desired signals. The solution is a dynamic decision algorithm that will follow temporary high-level interferences and adjust the decision threshold accordingly.

  There are two different algorithms; one for identifying transmissions of messages initiated by another unit, and one for identifying response from another unit to a message transmitted by the unit.

  The algorithm for identifying transmissions of messages initiated by another unit includes two settable parameters: **Noise Floor** and **Carrier to Interference Difference Level**.

  The **Noise Floor** parameter represents the equivalent noise level in the neighborhood of the unit, including both the thermal noise and average level of interference in the relevant spectrum.

  Carrier to Interference Difference Level is the minimal difference between the level that is defined as the **Current Noise Level** and the level of a “good” signal (a signal that the unit should treat as a possibly desired signal).

  The modem of the unit continuously estimates the level of the received energy at the relevant spectrum. The **Current Noise Floor** is defined as follows:

  If the last estimated energy level was lower than or equal to the **Noise Floor**, then the **Current Noise Floor** is equal to the **Noise Floor**.

  If the last estimated level was above the **Noise Floor**, it can be either interference or a possibly “good” signal. If it is lower than the last **Current Noise Floor**, or if the difference from the last **Current Noise Floor** is less than the **Carrier to Interference Difference**

Level, it shall be considered as interference and it becomes the updated **Current Noise Floor.**

Carrier to Interference Difference Level is the minimal difference between the **Current Noise Floor** and the level of a signal that will be defined as a "good" one.

This algorithm allows the unit to identify and track temporary high level interference and to adjust the decision threshold accordingly.

- **Noise Floor**: Enables the user to set the equivalent noise level that is affected by the thermal noise and the average interference level.

  Available values: -115 to –50 (dBm).

  Default value: **-112** (dBm).

- **Carrier to Interference Difference Level**: Enables the user to set the minimal difference between the **Current Noise Floor** and a "good" signal. In environment where there is a high probability that the level of interfering signals may temporarily increase significantly above the average level, this parameter should be set to a higher value.

  Valid values: 6 to 60(dB)

  Default value: **8**(dB)

Service Parameters (AU and SU)

The *Service Parameters* menu includes the following parameters:

- **User Filtering Parameters** – Only available in SUs. Defines IP addresses of user's devices that are authorized to access the wireless media, serving for security and/or control purposes. It can also be used to enable transmission/reception of specific protocol frames only. These filtering functions do not affect management frames that are sent to or generated by the unit or.

  Choose this option to define the following parameters:

  - **User Filtering Option** – Disables or enables the User Filtering feature. The available options are:
    - **Disable** (No filtering).
    - **IP Only** (only IP Protocol packets pass).
    - **User Defined Addresses Only** (only IP messages from/to IP addresses included in the User Filter Addresses list pass).
    - **PPPoE Protocol Only** (only PPPoE frames pass - Ethernet type 0x8863 and 0x8864).

      The default selection is **Disable**.

  - **Set User Filter Address** – Displays the current User Filter IP addresses. Allows you to enter up to 8 IP addresses to be used if

the User Defined Addresses Only option was selected in the User Filtering Option above.

The default for all addresses is **0.0.0.0**.

- **Set User Filter Mask** – Displays the current masks. Allows you to enter subnet masks for each of the User Filter IP Address entries.

  The default for all subnet masks is **255.0.0.0**.

- **Set User Filter Range –** Defines a range of addresses for each of the User Filter IP Address entries (the range includes the base address).

  Valid values: 0 – 255.

  The default value is **0** (not used).

NOTES:

You may use either Mask or Range (but not both) to define a group of user filter addresses.

If IP broadcast packets should reach the devices connected behind the SU unit, the Broadcast IP address should be included in the configured User Filter Address entries.

- **Delete a User Filtering Entry** – Displays the current list of IP addresses, subnet masks and ranges. Enter the list number (from 0 to 7) to delete the entry from the list (the list number will be replaced by the default values).

- **Delete All User Filtering Entries** – Deletes all User Filtering entries (and replaces them with the default values).

- **Show All User Filtering Parameters** – Displays the current User Filtering Option and the list of User Filtering addresses, subnet masks and ranges.

◆ **MIR and CIR Parameters** – The CIR (Committed Information Rate) value specifies the minimum data rate guaranteed to the applicable subscriber. The MIR (Maximum Information Rate) value specifies the maximum data rate available for burst transmissions, provided such bandwidth is available.

Under normal conditions, the actual Information Rate (IR) will be between the applicable CIR and MIR values: IR=CIR+K(MIR-CIR), where K is between 0 to 1 and is determined dynamically by the AU according to overall demand in the cell and the prevailing conditions that may influence the performance of the wireless link. In some situations the minimum rate (CIR) cannot be provided. This may occur as a result of high demand and poor wireless link conditions and/or high demand in cells with over subscription (total CIR higher than 1600Kbps). When this happens, actual information rate will be lower than CIR. The simple solution for managing information rate in such cases results in an unfair allocation of resources, as subscribers with higher CIR can actually get an IR lower than that given to subscribers with lower CIR. A special algorithm for graceful

degradation has been incorporated into the AU, ensuring that the degradation of performance for each individual subscriber will be proportional to its CIR.

The MIR/CIR algorithm uses buffers to control the flow of data. To average the performance over time, a special Burst Duration algorithm is employed to enable higher transmission rates after a period of inactivity. If no data was received from the Ethernet port during the last N seconds, the unit is allowed to transmit N times its CIR value without any delay. For example, after an inactivity time of 0.5 second, a unit with CIR = 64 Kbps can transmit up to 64 Kbits x 0.5 = 32 Kbits without any delay.

- **MIR/CIR Option –** Enables or disables the CIR/MIR support feature. In cells where the AU and all SUs use SW version 4.0 and higher, the MIR/CIR Option in the AU controls the operation of the whole cell. The MIR/CIR Option in the SU is thus meaningless, as the setting of the option in the AU will override possible conflicting setting in any of the served SUs. The option is available in the SUs only for compatibility with previous versions to support operation in cells where the AU uses SW version 3.X and lower.

  Default selection is **Disable**.

NOTE:

The value of the MIR/CIR option parameter must be the same for all Subscriber Units served by the same AU (i.e. Enable for all SUs or Disable for al SUs). Otherwise, throughput to/from all SUs in the cell may be reduced significantly.

- **MIR: AU to SU** (SU only) **–** Sets the Maximum Information Rate of the down-link from the AU to the SU. The MIR value cannot be lower than the corresponding CIR value.

  Valid values are from 32 to 2200 Kbps.

  The default value is **128 Kbps**.

- **MIR: SU to AU** (SU only) **–** Sets the Maximum Information Rate of the up-link from the SU to the AU. The MIR value cannot be lower than the corresponding CIR value.

  Valid values are from 32 to 2200Kbps.

  The default value is **128Kbps**.

- **CIR: AU to SU** (SU only) **–** Sets the Committed Information Rate of the down-link from the AU to the SU. The CIR value cannot be higher than the corresponding MIR value.

  Valid values are from 0 to 2200Kbps.

  The default value is **64Kbps**.

- **CIR: SU to AU** (SU only) **–** Sets the Committed Information Rate of the up-link from the SU to the AU. The CIR value cannot be higher than the corresponding MIR value.

Valid values are from 0 to 2200Kbps.

The default value is **64Kbps**.

NOTE:

The value of the MIR must be higher than the value of the applicable CIR. The system will not accept a MIR value that is lower than the current CIR value, and vice versa.

- **Maximum Burst Duration** (SU and AU) **–** Sets the maximum time for accumulating burst transmission rights according to the Burst Duration algorithm.

  Valid values: 0 – 2000 (milliseconds).

  Default value: **5** (milliseconds), allowing a maximum burst of (0.005 X CIR) Kbps, after an inactivity period of 5 milliseconds or more.

- **Maximum Delay** (SU only) – Sets the maximum permitted delay in the buffers system. Some applications are very sensitive to delay. If relatively high delays are permitted, such applications may suffer from poor performance due to accumulation in the buffers of data from other applications (e.g. FTP). The Maximum Delay parameter limits the number of available buffers. Data that is delayed more than the permitted maximum delay will be discarded. If the SU should support applications that are very sensitive to delay, the value of the Maximum Delay should be decreased.

  Valid values: 300 – 10000 (milliseconds).

  Default value: **5000** (milliseconds).

- **Graceful Degradation Limit** (AU only) – Sets the limit on using the graceful degradation algorithm. In cases of over demand, the performance of all SUs will be degraded proportionally to their CIR (IR=(100%-k%) x CIR). The graceful degradation algorithm will be used as long as $k \leq K$, where K is the Graceful Degradation Limit. Beyond this point the simple "brute force" algorithm will be used. The higher is the expected over demand in a cell, the higher should be the value of the Graceful Degradation Limit. Higher demand can be expected in cases of significant over subscription and/or in deployments where a high number of subscribers are in locations that do not enable proper communication with the AU at the highest data rate.

  Valid values: 0 – 70 (%).

  Default value: **70** (%).

- **Mir Only option** (AU only) – Enables or disables the option of forcing the MIR/CIR algorithm to use MIR values only. The MIR/CIR algorithm determines the actual information rate for each of the supported SUs under changing demand conditions, based on the configured CIR and MIR values. When the Mir Only

Option is enabled, the MIR/CIR algorithm is overridden and is forced to operate with MIR values only (e.g. the AU attempts to enable all SUs to transmit/receive information at the specified MIR value. When enabled, the graceful degradation algorithm, which is a part of the CIR/MIR algorithm, is also disabled.

The default is **Disable**.

- **Show MIR/CIR Parameters –** Displays the current values of the MIR and CIR parameters. In SUs, the display includes the Run-Time MIR/CIR Option, which is the actual status of the option (may be different from the MIR/CIR Option selected in the SU because it is controlled by the AU).

- **Show Service Parameters** – Displays the current values of the *Service Parameters*.

RADIUS Parameters Menu (Subscriber Units only)

Managing a large number of users creates the need for significant administrative support together with careful attention to security, authorization and accounting. The use of RADIUS (Remote Authentication Dial In User Service) enables operators to manage a single "database" of users, supporting authentication (verifying user name and password) as well as configuration information detailing the type of service to deliver to the user and the traffic that the user transmitted and received, for billing proposes.

The RADIUS is a protocol for carrying authentication, authorization, and configuration information between a Network Access Server, which desires to authenticate its links and a shared Authentication server. A Network Access Server (NAS) operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS servers, and then acting on the response. RADIUS servers are responsible for receiving user connection requests, authenticating the user, and then returning all configuration information necessary for the client to deliver service to the user.

Transactions between the client and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network. In addition, any user passwords are sent encrypted between the client and RADIUS server, using a method based on the RSA Message Digest Algorithm MD5.

The Access-Request is submitted to the RADIUS server via the network. If no response is returned within a length of time, the request is re-sent a number of times. Once the RADIUS server receives the request, it validates the sending client. A request from a client for which the RADIUS server does not have a shared secret must be silently discarded. If the client is valid, the RADIUS server consults a database of users to find the user whose name matches the request. The user entry in the database contains a list of requirements that must be met

to allow access for the user. This always includes verification of the password, but can also specify the client(s) or port(s) to which the user is allowed access.

In the BreezeACCESS system there is a RADIUS NAS (Network Access Server) implemented in each Subscriber Unit. The RADIUS server can be used for authentication purposes only, for accounting purposes only, or for both authentication and accounting purposes.

The RADIUS Parameters menu includes three sub-menus:

a. General RADIUS Parameters – intended for all users of RADIUS.

b. Authentication Parameters.

c. Accounting Parameters.

NOTE:

Different servers may be used for authentication and for accounting.

General RADIUS Parameters Menu

The General RADIUS Parameters menu is used to define general RADIUS parameters that must be configured by all SUs to be served by a RADIUS server, either for authentication only, for accounting only, or for both authentication and accounting.

- **User Name** – To define the user name that will be used by the RADIUS server to identify the SU.

  Valid values: A string of up to 64 printable ASCII characters, case sensitive.

  Default value: The unit's MAC Address

- **User Password** – To define the password to be used by the RADIUS server to confirm the identity of the SU.

  Valid values: A string of up to 64 printable ASCII characters, case sensitive.

  Default value: **RadiusPassword1**.

- **Shared Secret** – To define the key that will be used for encrypting the User Password for increased security. The algorithm used for encrypting the User Password is MD5.

  Valid values: A string of up to 20 printable ASCII characters, case sensitive.

  Default value: **RadiusSecret1234**.

Authentication Parameters Menu

The implementation is based on RFC 2865. The mechanism allows an SU to synchronize and associate to its AU, then request authentication from the RADIUS server. Only if the authentication is successful the user will receive services (data and voice). It is then possible to download from a remote server the full unit services configuration

(CIR/MIR, Telephone number etc.). If the authentication is not successful, the data and voice ports of the SU will be blocked.

- **Authentication Option** – To enable or disable the use of RADIUS for authentication. When this option is enabled and the **RADIUS Server Authentication IP Address** is configured to an address other than **0.0.0.0**., the SU enables the RADIUS authentication feature.

  Default selection: **Disable**

- **RADIUS Server Authentication IP Address** –To define the IP address of the RADIUS server to be used for authentication.

  The default address is **0.0.0.0** (none).

- **RADIUS Server Authentication Port –** Specifies the UDP port number used by the Radius server for authenticating the clients.

  Valid values: 1000 to 65535.

  The default value is **1812** (RFC requirement).

- **Show Authentication Parameters and Status** – To display the Authentication parameters and the current status. The status can be Idle, Sending Request, Waiting For Response, Sending Challenge, Authenticated or Rejected.

Accounting Parameters Menu

If the Accounting Option is enabled, then every period defined by the service provider (Accounting Interval) the NAS (SU) will update the Radius Accounting Server with the traffic passed through it during the period. From the Radius Server point of view this period is a session in accordance with the RFC 2866 definitions. The information is sent to the Radius Server using the standard Radius attributes. The record structure is described in RADIUS Record Structure, page 2-93.

The *Accounting Parameters* menu allows enabling the RADIUS client embedded in the Subscriber Unit and configuring the parameters that control the transmission of accounting records to a RADIUS billing server. The *Accounting Parameters* menu includes the following parameters:

- **Accounting Option** - To enable or disable the accounting records transmission feature. When this option is enabled and the **RADIUS Server Accounting IP Address** is configured to an address other than **0.0.0.0**., the SU enables the RADIUS accounting client.

  The default is **Disable**.

- **RADIUS Server Accounting IP Address** –To define the IP address of the RADIUS server to be used for accounting.

  The default address is **0.0.0.0** (none).

- **RADIUS Server Accounting Port –** Specifies the UDP port number used by the Radius server for accounting.

  Valid values are 1000 to 65535.

The default value is **1813** (RFC requirement).

- **Accounting Interval** – Specifies the interval in seconds between two consecutive transmissions of accounting records.

  Valid values are from 60 to 6000 seconds (1 to 100 minutes).

  The default value is **90 seconds**.

- **Show Accounting Parameters –** Displays the current values of the Accounting parameters.

RADIUS Record Structure

Each RADIUS Accounting message includes a Session ID and up to 11 Ethernet Specific records. A space is used to separate fields from each other.

Table 2-20: Session ID Structure

Field	Format	Description
Unit Name	16 ASCII characters (no nulls).	The Unit name
Unit MAC Address	xx-xx-xx-xx-xx-xx (hex format)	The IEEE MAC address of the SU.
Message ID	4 hex digits	The Message ID
Reset Counters	2 hex digits (0-99)	The number of resets since power-up of the unit.

Table 2-21: Ethernet Vendor Specific Record Structure (Vendor Specific ID is 710)

Field	Format	Description
Traffic Type	1 hexadecimal digit	Data (0)/Management (1)/Voice (2).
VLAN ID	3 hexadecimal digits	VLAN ID.
Layer 3 Protocol	4 hexadecimal digits	Third layer protocol type (IP, ARP).
Remote IP Address	xxx.xxx.xxx.xxx (decimal format)	The remote IP Address.
IP Type Of Service	2 hexadecimal digits	Precedence/ Delay/ Throughput/ Reliability.
VLAN Priority	1 hexadecimal digits	VLAN Priority.
ETH Output Octets	8 hexadecimal characters	Number of octets successfully transmitted to Ethernet.
ETH Input Octets	8 hexadecimal characters	Number of octets received from Ethernet.
ETH Output Packets	8 hexadecimal characters	Number of packets successfully transmitted to Ethernet.
ETH Input Packets	8 hexadecimal characters	Number of packets received from Ethernet.
WLAN Output Octets	8 hexadecimal characters	Number of octets successfully transmitted to Wireless.
WLAN Input Octets	8 hexadecimal characters	Number of octets received from Wireless.
WLAN Output Packets	8 hexadecimal characters	Number of packets successfully transmitted to Wireless.
WLAN Input Packets	8 hexadecimal characters	Number of packets received from Wireless.

Security Parameters (AU and SU)

Unauthorized wireless connection is prevented by using the Wired Equivalent Privacy (WEP) algorithm defined in the IEEE 802.11 Wireless LAN standard. The WEP is based on RSA's RC4 encryption algorithm. The following parameters are available in the *Security Parameters* menu:

- **Authentication Algorithm** – Determines the operation mode of the unit. The available options are:
  - **Open System**: An SU configured to Open System can be authenticated only by an AU that is also configured to Open System. The WEP algorithm is not used.

- ❖ **Shared Key**: Authentication enabled. The authentication messages are encrypted. An SU configured to use Shared Key can be authenticated only by an AU configured to use Shared Key, provided they both use the same WEP Key. Both the WEP Key number and the WEP Key should be identical at both sides of the link.
- ❖ **Support All (AU only):** The AU authenticates all SUs, regardless of the Authentication Algorithm and WEP Key configured in the SU. This is intended primarily for installations with possible "stolen" SUs. In such cases, initial authentication will be in this mode, and the mode will be changed to Shared Key only after configuring appropriate WEP Keys in the AU as well as in all associated SUs, excluding known "stolen" SUs that belong to the Black List.

  If the required algorithm is Shared Key, do the following:
  - Define at least one of the four ***WEP Keys*** by selecting one of them from the *Security Parameters* menu and entering the required key.
  - In an SU, select ***Default Key ID*** from the *Security Parameters* menu and enter the number of a defined WEP key.
  - Select ***Authentication Algorithm*** from the *Security Parameters* menu.

  The *Authentication Algorithm* menu opens.
  - Select **Shared Key**.

NOTE:

The **Shared Key** option cannot be selected until at least one **WEP Key** is configured. In the SU the appropriate **Default Key ID** must also be configured.

The default is **Open System**.

◆ **Default Key ID** (SU Only)– Defines the ID of the key to be used for encryption of transmitted authentication messages and decryption of received authentication messages.

Valid values are from 1 to 4.

The default is **WEP KEY # 1**.

◆ **WEP KEY # 1** through **WEP KEY # 4 –** Enters the encryption key to be used for initialization of the pseudo-random number generator used in the RC4 encryption process. At least one WEP Key must be configured before the Shared Key authentication mode can be used. The Subscriber Unit must use the same WEP Key that is used by the Access Unit.

The WEP Key is a string of 10 hexadecimal numbers.

The default for all 4 keys is a string of 10 zeros (no key).

NOTE:

It is recommended to change the WEP Keys periodically, to enhance system security.

Voice Parameters (Subscriber Units with Voice Support Only)

The parameters in the *Voice Parameters* menu include the following options:

- **Volume –** Sets the gain of the voice signal to the earphone.

  Available range is 0 dB to -20 dB in 1 dB steps.

  The default value is **-3 dB**.

- **Echo Cancellation –** Enables or disables the built-in echo cancellation feature.

  The default value is **Enable**.

- **Voice Codec –** Specifies the relative priority of the codecs. The units support the following codecs:

  - G723.1 (6.4 Kbps rate, 1:10 compression ratio)
  - G729 (8 Kbps rate, 1:8 compression ratio)
  - G711 Ulaw (64 Kbps, no compression, US standard)
  - G711 Alaw (64 Kbps, no compression, European Standard)
  - G729AnnexA (G729 with reduced complexity)
  - G729wAnnexB (G729 with silence compression)
  - G729Annex AwAnnexB (G729 with reduced complexity and silence compression)

  You can enter a list of one to seven codecs, specifying the relative priorities to be offered during capabilities' exchange according to the H.323 standard. For example, enter 1 to always use the G.723.1 codec. Enter 2, 1, 3, 4 to set the priorities according to the following order: G729, G723.1, G711μlaw, G711 Alaw.

  The range is **1 to 7654321**, using digits 1 to 7.

  The default is **2134**.

- **Compression Efficiency** – Specifies the number of voice frames to be packed into one RTP (Real Time Protocol) frame. The higher the value of the Frames per Packet parameter, the higher are the delay introduced (reduced quality) and the higher is the number of simultaneous voice sessions that can be supported by the AU. There is a separate setting for each of the voice codecs that are supported by the unit.

The allowed range differs among codecs, in accordance with the different packet sizes (30 ms for G723.1, 10 ms for G729 and 5 ms for G711).

The valid values and default values are:

- **G723 Frames Per Packet** – Valid range 1-8, Default value is **2**
- **G729 Frames Per Packet –** Valid range is 1-12, Default value is **6.** If upgrading from a previous version, this value must be set to 6 if ***ACSE Option*** is enabled. (covers all G729 codecs, including G729Annex A, G729wAnnexB and G729AnnexAwAnnexB)
- **G711u-law Frames Per Packet –** Valid range is 1-16, Default value is **12**
- **G711A-law Frames Per Packet –** Valid range is 1-16, Default value is **12**

NOTE:

When the ***ACSE Option*** is enabled, this parameter is not applicable and the default value is always used.

- **Voice Activity Detection –** Enables or disables the use of Voice Activity Detection (VAD). When the VAD algorithm is enabled, silence intervals are identified. Therefore, only relevant information is transmitted, using less bandwidth than during voice activity intervals. This allows for a better overall utilization of the available bandwidth. Voice Activity Detection is not applicable when using the G711 codec. Voice Activity Detection is implemented automatically in G729wAnnexB and G729 Annex A w Annex B (Annex B activates the silence compression).

  Available options are:

  - **Voice Activity Detection OFF**.
  - **Voice Activity Detection G7231** (enable when using G723.1 compression).

  The default selection is **Voice Activity Detection OFF**.

Dialing Parameters (Subscriber Units with Voice Support Only)

The parameters in the *Dialing Parameters* menu include the following options:

- **Pulse Dialing –** Enables or disables the automatic pulse dialing detection feature to support telephones with pulse dialing.

  The default selection is **Enable**.

- **Gatekeeper Option –** If set to Enable, the unit will communicate with the Gatekeeper to resolve the destination telephone number

into the IP address and to register its own phone number and IP address with the Gatekeeper.

The default selection is **Disable**.

- **GateKeeper/GateWay IP Address –** Specifies the IP address of the Gateway/Gatekeeper. If the Gatekeeper Option parameter (see above) is set to Enable, an IP address must be specified.

  The default value is **0.0.0.0**.

- **Alternate Gatekeeper Option -** Enables or disables the Alternate Gatekeeper feature. For the purposes of ensuring system availability, redundancy, and scalability, the Gatekeeper may provide the RAS signaling function by utilizing multiple physical or logical devices, referred to as Alternate Gatekeepers.

  If the Alternate Gatekeeper Option set to Automatic Discover, the Alternate Gatekeeper IP address is received from the Primary GK. Otherwise, in Manual Discovery mode the Alternate Gatekeeper IP address is specified by the Alternate Gatekeeper IP Address parameter (see below).

  Valid selections: Disable, Enable (Automatic Discovery), Enable (Manual Discovery).

  Default selection is **Disable**.

- **Alternate Gatekeeper IP Address** – Sets the Alternate Gatekeeper IP address when Alternate Gatekeeper Option parameter (see above) is set to Manual.

  The default value is **0.0.0.0**.

- **Telephone Number –** The telephone number as specified in the Gateway (if it is required by the specific type of Gateway used).

  Valid values: up to 10 digits (0-9).

  The default number is **0000….0 (10 zeros)**.

NOTE:

When using a Gateway without a Gatekeeper, this number must be predefined in the Gateway

- **H323 Terminal ID –** The H323 Terminal ID (Name) to be used for calling the terminal when the caller uses this feature (e.g. NetMeeting).

  Valid values: up to 24 characters.

  The default selection is **X (No H323 Terminal ID)**.

- **IP Dialing Option –** Enables or disables dialing using IP addresses.

  The default selection is **Enable**.

- **IP Dialing Indicator –** Specifies the prefix used to identify an IP Dialing string. Applicable only if the *IP Dialing Option* parameter (see above) is set to *Enable*. Digits dialed after IP Dialing Prefix are

assumed to be the destination IP address. 12- and 3-digit numbers are allowed. 3- digit numbers are used to dial to stations in the same subnet, and 12- digit number are used to dial to any IP address. If a 3-digit number is dialed the Setup message is sent to the corresponding IP address in the local subnet. When dialing a 12-digit number (e.g. *abcdefghijkl*), the Setup message is sent directly to the IP address *abc.def.ghi.jkl*.

Valid values: up to 3 phone key-pad digits (0-9, *, #, A, B, C, D)

The default value is *****.

- **Automatic Prefix –** specifies a default prefix (number of the Gateway trunk port) to be automatically inserted and transmitted to the gateway before the dialed number. The Automatic Prefix will be inserted only if the ***Dialing Option*** parameter (see below) is disabled, or if it is enabled and the first dialed digit is different from the defined Inter-Regional Prefix.

  Valid values: up to 8 phone key-pad digits (0-9, *, #, A, B, C, D)

  The default is **X (no Gateway Prefix)**.

- **Fast Start –** Enables or disables the fast connect protocol, which is a H.323 Version II feature that allows decreasing the connection set-up time (if supported by the Gateway).

  The original procedure prior to H.323 Version II required four round trips of messages between endpoints before the first media stream is exchanged between peers. Fast Connect, or Fast Start, is a new procedure added to H.323 version II. It reduces the number of round trips to one by combining the call connect procedures into a single H.225 transaction.

  The default selection is **Enable**.

- **Information Transfer Capability –** To define the value of the information transfer capability element in the Q.931 SETUP message.

  Available selections:

  - **Speech** (used by H.323 speech terminals)
  - **Unrestricted** (used by H.323 AudioVisual terminals for unrestricted digital information)
  - **Restricted** (used H.323 AudioVisual terminals for restricted digital information)
  - **3.1 kHz audio** (used by H.323 speech terminals)
  - **Unrestricted with tones** (used by H.323 AudioVisual terminals for transmission of unrestricted digital information with tones/announcement)
  - **Video** (not used by H.323 terminals)

  The default is **Speech**.

NOTE:

This information element is encoded according to Figure 4-11/Q.931 and Table 4-6/Q.931. The SU support only H323 Speech traffic and a change of the default value is not recommended. A change will be needed only as result of special PSTN switch requirements.

- **Dialing Prefix Parameters** – Supports definition of prefix strings indicating an inter-regional or international call. The algorithm supports dialing plans where one specific digit is used as the prefix for inter-regional calls, and two specific digits are used as the prefix for international calls, where the first one is the same as the inter-regional call prefix. It can also support dialing plans in which the inter-regional prefix should be removed at the CPE before the dialed number is transferred to the system. The dialing plan support algorithm incorporated into the units operates as follows:
  - If the Dialing Prefix Option is disabled the unit will insert the Automatic Prefix (if defined) before the dialed number. Otherwise it will be forwarded as dialed.
  - If the Dialing Prefix Option is set to Enabled and the first dialed digit differs from the Inter-Regional Prefix the unit will insert the Automatic Prefix (if defined) before the dialed number. Otherwise it will be forwarded as dialed.
  - If the Dialing Prefix Option is set to Enable & Block Inter-Regional Prefix and the first dialed digit differs from the Inter-Regional Prefix, the unit will insert the Automatic Prefix (if defined) before the dialed number. If the first dialed digit is the Inter-Regional Prefix and the second one differs from the International Prefix (indicating an inter-regional call), the first digit (the Inter-Regional Prefix) will be removed before forwarding the dialed number, thus blocking inter-regional calls at the unit. Otherwise it will be forwarded as dialed.

- **Dialing Prefix Option** – Enables or disables the dialing prefix support capability.

  Valid options are: Disable, Enable, Enable & Block Inter-Regional Prefix.

  Default selection is **Disable**.

- **Inter-Regional Prefix** – Defines the prefix indicating an inter-regional call. This is also the first digit in the two digits string indicating an international call.

  Valid values: One phone key-pad digit (0-9, *, #, A, B, C, D) and X (no prefix).

  Default value: **0**.

- **International Prefix** – Defines the second digit in the two digits string indicating an international call.

  Valid values: One phone key-pad digit (0-9, *, #, A, B, C, D) and X (no prefix).

Default value: **0**.

- **Registration TTL** – Defines the registration Time To Live. Registration is the process by which an endpoint informs the Gatekeeper of its Transport Addresses and alias addresses. Registration must occur before any calls are attempted and may occur periodically as necessary (for example, at endpoint power-up).

  After Registration process has finished an endpoint will no longer send Registration Request (RRQ) messages. So, GK may become unavailable for the endpoint after its reset. To exclude this possibility a keep-alive mechanism should be applied.

  An endpoint's registration with a Gatekeeper may have a finite lifetime. An endpoint may request a **timeToLive** in the RRQ message to the Gatekeeper. The Gatekeeper may respond with an RCF containing the same **timeToLive** or a shorter **timeToLive**. After this time, the registration shall be expired. The **timeToLive** is expressed in seconds. Prior to the expiration time, the endpoint may send an RRQ message having the **keepAlive** bit set. The keep-alive RRQ resets the time to live timer in the Gatekeeper, allowing the registration to be extended. After the expiration time, the endpoint must re-register with a Gatekeeper using a full RRQ message.

  Valid values: 0 (the keep-alive mechanism is not activated), 1-65535 (seconds)

  Default value: **0**

- **DTMF Relay** – Selects the method of handling DTMF signals. DTMF input may be transferred through a network in-band by RTP payloads, or using DTMF relay. The use of DTMF relay is preferred as it overcomes the problems of RTP packet loss and jitter. When DTMF relay is used, DTMF digits are transferred using H.245 protocol messages (standard), or Q.931 protocol message (proprietary). The DTMF relay can handle all phone-pad digits (0-9, A-D, *, #) and Hook-Flash (!).

  The following options are available:

  - **Disable** – DTMF tones are transferred in band (through the voice codec using the RTP protocol)
  - **Enable** – DTMF signals are relayed via H.245 sessions. If Fast Start is enabled, a H.245 session will be forced upon detecting DTMF signals.
  - **Enable Proprietary** – If Fast Start is enabled, DTMF signal will be relayed via Q.931 sessions. If Fast Start is disabled, DTMF signal will be relayed via H.245 sessions.

  The default selection is **Enable**.

- **Endpoint Type** – Defines the EndpointType components in H.323 messages for interoperability with other equipment using H.323.

  Available options are Terminal, Gateway.

  The default is **Terminal**

- **Fax Relay** – Defines the use of T.38 protocol for relaying fax messages. T.38 is a protocol dedicated to fax. When the ***Fax Relay*** Option is enabled, fax signals are demodulated at the voice/fax gateway and sent over the IP network as IP fax packets (IFP) using UDP. A redundancy mechanism can be employed to restore IFP fax data packets. At the other end of the IP network, the remote gateway decodes IP fax packets and regenerates fax signals.

  Modulation methods that can be used with the T.38 format are V.21 Channel 2, V.27ter 2400, V.27ter 4800, V.29 7200, V.29 9600, V.17 7200, V.17 9600, V.17 12000, and V.17 14400.

  The Fax Relay menu includes the following parameters:

  - **Fax Relay Option** – Enables or disables the use of the T.38 protocol for relaying fax messages.

    The default selection is **Disable**.

NOTE:

To enable the ***Fax Relay Option***, the ***Fast Start*** parameter must also be enabled.

  - **Fax Relay Redundancy** – Defines the redundancy (number of additional times each fax frame is transmitted) to be used when transmitting T.38 fax messages.

    Valid values: 0 –5.

    Default value: **3**.

- **Battery Polarity –** Defines the battery polarity for supporting an external device, e.g. for coins or tokens charging purpose. This feature is fully supported by units with voice card from revision D and up.

  The available options are:

  - **Forward Battery** – Regular polarity
  - **Reverse Battery** – Reverse polarity
  - **Forward -> Reverse Battery** – Change the polarity from forward to reverse
  - **Reverse -> Forward Battery** – Change the polarity from reverse to forward

  The default is **Forward Battery**.

- **Caller ID:** Defines whether the unit will support generation of Caller ID (CID) signaling and if CID generation is supported, which standard will be used. The unit supports two CID signaling standards:

  - Voice band Frequency Shift Keying (FSK) signaling in accordance with ETSI ETS 300 659 – 1

- 1200-baud tone modulation in accordance with Bellcore 202 standard.

The Caller ID parameter is supported only by units using a Voice card HW revision D and higher.

The following options are available:

- **Disable**
- **ETSI DT-AS:** CID signaling in accordance with ETSI ETS 300 659 -1, using Dual Tone Alerting Signal to indicated to the called terminal that CID data transmission is to be expected.
- **ETSI RP-AS:** CID signaling in accordance with ETSI ETS 300 659 -1, using Ringing Pulse Alerting Signal to indicate to the called terminal that CID data transmission is to be expected.
- **ETSI – During Ringing:** CID signaling in accordance with ETSI ETS 300 659 -1, transmitting CID data during the first long silence between two ring patterns.
- **Bellcore MDMF:** CID signaling in accordance with Bellcore 202, using Multiple Data Message Format (MDMF), which includes a name field in addition to the date, time and number.
- **Bellcore SDMF:** CID signaling in accordance with Bellcore 202, using Single Data Message Format (SDMF), which includes the date, time and number.

  The default selection is **Disable**.

- **Stop Dialing Timeout:** The inactivity time following the last dialed digit that will be identified by the unit as an indication to end of dialing.

  Valid range: 3 to 60 seconds

  Default value: **5** seconds

- **Stop Dialing Indicator:** Uses the # sign to indicate end of dialing, thus to speed the dialing process. The options are:
  - **Disable:** The # sign is interpreted as a part of the dialed sequence. End of dialing is determined by the ***Stop Dialing Timeout*** parameter.
  - **Enable:** The # sign is interpreted as indicating end of dialing sequence.

    The default is **Disable**.

- **Overlap Sending** - To enable or disable the overlap sending feature. A gatekeeper or a gateway supporting overlap sending does not require dialing termination signaling for setting up a call. Otherwise a dialing termination signal must be supplied by the unit.

  When **Overlap Sending** is enabled, each dialed digit is transmitted immediately. When disabled, dialed digits are accumulated and transmitted according to the rules set by other dialing parameters.

Upon enabling overlap sending, the settings of other dialing parameters are overridden as follows:

a. **IP Dialing Option**, **Dialing Prefix Option** and **Stop Dialing Indicator** are disabled even if the applicable parameter is set to Enable.

b. **Automatic Prefix** is not used and **Stop Dialing Timeout** has no effect.

The default selection is **Disable**.

Telephony Signals (Subscriber Units with Voice Support Only)

The *Telephony Signals* menu defines the various call progress tones that indicate the status of a telephone call, the ringer parameters and some timeouts. The call progress tones are generated by the Subscriber Unit in accordance with call progress information as received from the AU or the telephony network.

The parameters in the *Telephony Signals* menu include the following options:

- **Telephony Country Standard** – Selects the call progress tones standard. The following options are available:
  - Proprietary – Allows definition of specific tones (see below).
  - Germany
  - Sweden
  - France
  - United Kingdom
  - Belgium
  - USA
  - Chile

  The default selection is **USA**.
- **Dial Tone –**Defines the dial tone transmitted to the earphone to indicate that the call can be supported by the system and that the caller may start dialing.
- **Ring-Back Tone –** Defines the tone transmitted to the earphone to indicate that the telephone of the called party is ringing.
- **Busy Tone –** Defines the tone transmitted to the earphone to indicate that the telephone of the called party is busy.
- **Congestion Tone** - Defines the tone transmitted to the earphone to indicate that the system cannot currently support the call (e.g. if a line is not available since the AU currently supports the maximum allowed number of voice sessions).

- **Error Tone –** Defines the tone transmitted to the earphone to indicate that the system cannot currently support the call (e.g. if for any reason the call was disconnected because of a problem in the wireless link or incompatible capabilities) or if the user did not hang up after exceeding the specified duration of the Dial, Ring Back, Busy or Congestion Tones.
- **High Level Error Tone –** Defines the high level tone transmitted to the earphone to better attract the attention of the user if he did not hang up after exceeding the specified duration of the Error Tone.

  The various tones are defined by specifying the following parameters:

  - **Frequency 1** – One of two frequencies that can be used for generating the applicable tone.

    Valid values are 0-3000 (in Hz).

  - **Frequency 2** – The second of the two frequencies to be used for generating the applicable tone.

    Valid values are 0-3000 (in Hz).

  - **Level 1** – The level (in dBm) of Frequency 1.

    Valid values are –32 to +3.

  - **Level 2** – The level (in dBm) of Frequency 2.

    Valid values are –32 to +3.

  - **Cadence On** – The ringing time (on) in the tones-silence sequence of the tone.

    Valid values are 100 – 10,000 milliseconds, 0 (0 means that the tone is not used).

  - **Cadence Off** – The silence time (off) in the tones-silence sequence of the tone.
    Valid values are 100 – 10,000 milliseconds, 0 (0 means no silence – a continuous tone).

  - **Duration –** The maximum duration of transmitting the tone to the earphone. Tone generation will cease upon hang-up.

    Valid values are 0 – 10,000 seconds.

- **Ring Frequency** - Defines the ring frequency parameters (that define the ringing of the telephone set), if the selected *Telephony Country* parameter is *Proprietary*. The following parameters can be defined:

  - **Ringer Frequency** – the frequency of activating the Ringer.

    Valid values are: 17Hz, 20Hz, 25Hz, 50Hz.

  - **Cadence On** – The ringing time (on) in the ringing-silence sequence of the Ringer.

    Valid values are 100 – 10,000 milliseconds.

- **Cadence Off** – The silence time (on) in the ringing-silence sequence of the Ringer.

  Valid values are 100 – 10,000 milliseconds.

- **Duration** - The maximum duration of activating the ringer. Ringing will cease upon detecting off-hook condition.

  Valid values are 0 – 10,000 seconds.

◆ **Timeouts** – Defines the following timeouts:

- **Min. Flash Detect Timeout** and **Max. Flash Detect Timeout –** A short on-hook time that is between the values of these two parameters will be considered as Hook Flash.

  Valid values: 0 – 2,000 milliseconds

- **Disconnect Timeout –** The minimum time for decision on an on-hook condition.

  Valid values: 0 – 2,000 milliseconds

- **Inter-Digit Timeout –** Applicable only for pulse dialing. The minimum time between two consecutive pulses to be considered as separating between two digits.

  Valid values: 0 – 2,000 milliseconds

- **Called Party Release Timeout –** The minimum time for an on-hook signal on the called party side to be considered as call disconnect.

  Valid values: 0 – 10,000 seconds

The following tables provide details concerning the values of the parameters of the various call progress tones and the ringer as well as the Timeouts for the available country standards.

Table 2-22: Parameters of Call Progress Tones and Ringer - Germany

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	450	-18	0	0			15
Ring Back	450	-18	0	0	1000	4000	60
Busy	450	-18	0	0	500	500	15
Congestion	450	-18	0	0	250	250	0
Error	450	-18	0	0	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	25				1000	5000	60

Table 2-23: Parameters of Call Progress Tones and Ringer - USA

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	350	-13	440	-13			15
Ring Back	440	-19	480	-19	1000	3000	60
Busy	480	-24	620	-24	500	500	15
Congestion	480	-24	620	-24	1000	1000	0
Error	480	-24	620	-24	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	20				1000	3000	60

Table 2-24: Parameters of Call Progress Tones and Ringer - Sweden

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	425	-18	0	0			15
Ring Back	425	-18	0	0	1000	5000	60
Busy	425	-18	0	0	250	250	15
Congestion	425	-18	0	0	250	750	0
Error	425	-18	0	0	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	25				1000	5000	60

Table 2-25: Parameters of Call Progress Tones and Ringer - France

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	425	-18	0	0			15
Ring Back	425	-18	0	0	1500	3500	60
Busy	425	-18	0	0	500	500	15
Congestion	425	-18	0	0	500	500	0
Error	425	-18	0	0	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	25				1500	3500	60

Table 2-26: Parameters of Call Progress Tones and Ringer – United Kingdom

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	350	-18	440	-18			15
Ring Back	400	-18	450	-18	400	200	60
Busy	400	-18	0	0	375	375	15
Congestion	400	-18	0	0	400	350	0
Error	400	-18	0	0	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	25				400	200	60

Table 2-27: Parameters of Call Progress Tones and Ringer - Belgium

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	425	-12	0	0			15
Ring Back	425	-18	0	0	1000	3000	60
Busy	425	-18	0	0	500	500	15
Congestion	425	-18	0	0	167	167	0
Error	425	-18	0	0	200	200	0
High Level Error	0	0	0	0	0	0	0
Ring Frequency	25				1000	3000	60

Table 2-28: Parameters of Call Progress Tones and Ringer – Chile

	Frequency 1		Frequency 2		Cadence		Duration (s)
Tone	Freq (Hz)	Level (dB)	Freq (Hz)	Level (dB)	On (ms)	Off (ms)	
Dial Tone	400	-6	0	0			20
Ring Back	400	-6	0	0	1000	3000	120
Busy	400	-6	0	0	500	500	20
Congestion	400	-6	0	0	200	200	20
Error	400	-6	0	0	500	500	20
High Level Error	400	3	0	0	500	500	20
Ringer	20				1000	3000	120

Table 2-29: Timeouts

Country	Min. Flash Detect (ms)	Max Flash Detect (ms)	Disconnect (ms)	Inter-digit (ms)	Called Party Release (s)
Germany	120	1000	1000	100	0
USA	120	1000	1000	100	0
Sweden	120	1000	1000	100	0
France	120	1000	1000	100	0
United Kingdom	120	1000	1000	100	0
Belgium	120	1000	1000	100	0
Chile	220	320	320	500	60

Hopping Parameters (GU)

The *Hopping Parameters* Menu allows configuration of the hopping mechanism. The GPS modules deliver signals to the Access Units that insure that their hopping patterns are fully synchronized. This includes synchronizing the time each unit starts a new hop and ensuring that units start the hopping sequence simultaneously.

- **Number of Hopping Frequencies** – Configures the ***Number of Hopping Frequencies*** parameter to guarantee that all the Access Units managed by the GPS module will start their hopping sequence simultaneously.

  To determine the correct number of hopping frequencies, access the monitor program in one of the AU units, select *Show Basic Configuration* in the *Info Screens menu* and view the *Number of Hopping Frequencies* value displayed.

  If the ISM hopping sequence is used (ISM US FCC or ISM International), the number of hopping frequencies is 79.

- **Dwell Time** – Applicable only when the ***ACSE Option*** is disabled. When the ***ACSE Option*** is enabled this parameter is not applicable and the dwell time is the ***ACSE Dwell Time***, set to a fixed value of 60 milliseconds (see page 2-85).

- **ACSE Option –** see page 2-63

NOTE:

The values of the ***ACSE Option*** and ***Dwell Time*** (if the ***ACSE Option*** is disabled) parameters must be the same for all GPS modules and Access Units in the system to enable synchronized hopping.

- **GPS Antenna Recovery** - Under normal operating conditions, the BS-GU module uses the time signals it receives from the GPS antenna to generate the synchronization signals for the AUs. When two or more BS-GU modules are daisy-chained, the signals from the GPS antenna are transferred to all "slave" BS-GU modules via the SYNC OUT - SYNC IN cable, and all BS-GUs use these signals to generate synchronization signals for their AUs.

  The BS-GU can detect whether a daisy-chaining cable is connected to its' SYNC IN port; If a daisy-chaining cable is connected to the SYNC IN port, the unit is a "slave" unit. If a daisy-chaining cable is not connected to the SYNC IN port, the unit will behave like a "master".

  The BS-GU continuously checks whether it receives proper PPS (Pulse Per Second) signals from the GPS antenna. Proper PPS signals are exactly one second apart. When a BS-GU detects that it does not receive proper timing signals from the GPS antenna, it will behave as follows:

  a. If the BS-GU is a "master", it will start generating synchronization signals using its internal clock. The

synchronization signals will also be transferred to the SYNC OUT port.

b. If a BS-GU is a "slave", it will use the synchronization signals it receives from the "master" via the SYNC IN port. It will also transfer these signals to its SYNC OUT port for use by the next slave module if applicable.

A slave module continuously monitors the lines from the GPS antenna in its SYNC IN port. If it determines that proper PPS signals are received (at least three consecutive PPS signals one second apart), it will automatically revert to the regular operating mode, using the PPS signals for generating its synchronization signals.

A master BS-GU must enter a special antenna recovery mode to check the validity of the signals it receives from the GPS antenna.

NOTE:

During Antenna Recovery mode the master BS-GU module stops generating synchronization signals for several seconds. Therefore, the rate of entering this mode should be minimal.

The antenna recovery mode can be activated either manually or automatically, using the **GPS Antenna Recovery** menu:

- **Manual Recovery Mode** - Enables to initiate a single antenna recovery process during which the unit checks the signals it receives from the GPS antenna. The manual recovery mode is completely independent of the automatic recovery mode, meaning that a manual recovery process can be initiated by the user regardless of the selected option in **Automatic Recovery Option**. Typically, manual recovery will be initiated after connecting/re-connecting or fixing a problem in the GPS antenna.
- **Automatic Recovery Mode** - Enables to control an automatic recovery process:
  - **Automatic Recovery Option** - To enable or disable automatic initiation of antenna recovery process. If a GPS antenna is not used, the Automatic Recovery Option should be disabled.

    The default selection is **Enable**.
  - **Automatic Recovery Interval** - To define the time interval between two consecutive initiations of automatic antenna recovery processes.

    Valid values: 5 to 1440 (minutes)

    Default value: **15** (minutes)

NOTE:

The GPS Antenna Recovery menu is applicable only to a "master" BS-GU module.

Alarm Parameters (GU)

The GU module serves also as the alarms control unit for the BreezeACCESS system and auxiliary equipment. It has dry contact connections to 4 external alarm inputs (Alarm In 1 through Alarm In 4), that turn on upon contact closure. It also receives alarm indications from BreezeACCESS power supply module (Alarm In 7 through Alarm In 10), that turn on to indicate a power failure or over temperature problem in any of the two optional power supplies. PS1 alarms refer to a power supply module inserted in the left-most slot of the chassis. PS2 alarms refer to a power supply module inserted in the right-most slot of the chassis. Alarm In 5 (GPS Antenna Status) is generated internally in the GU module, and it is turned on to indicate that proper PPS (pulse per second) timing signals are received from the GPS antenna.

NOTES:

Over Temperature alarm indication is only supported by the AC power supply module.

In installations with a single power supply module, the GU module doesn't function (and therefore will not provide an alarm indication) upon total failure of the power supply or upon failure of the 5 V module.

The GU module can also control 3 Alarm Out relay, where each relay has a common contact, a normally open (NO) contact and a normally closed (NC) contact.

The *Alarm Parameters* menu allows access to the following sub-menus:

- Alarms In Names.
- Alarms Out Names.
- Automatic Alarms Out Definition.
- Alarms Out Control.
- Show Alarm Parameters.

Alarms In Names

The *Alarms In Names* menu allows names for each of the four external alarm indications that can be connected to the AL IN connector to be defined. These names can reflect the specific environment in which the module is being used (e.g. "Smoke Detector 1" or "Main Door").

Each Alarms In Name can contain up to 31 printable ASCII characters (case sensitive).

The default names are **Alarm In 1** through **Alarm In 4**.

Alarms Out Names

The *Alarms Out Names* menu allows names for each of the three external devices that can be connected to the AL OUT connector to be defined. These names can reflect the specific environment in which the module is being used (e.g. "Alarm Light 1").

Each Alarms Out Name can contain up to 31 printable ASCII characters (case sensitive).

The default names are **Alarm Out 1** through **Alarm Out 3**.

Automatic Alarms Out Definition

The *Automatic Alarms Out Definition* menu allows you to define the conditions under which each of the 3 Alarms Outs is to be activated (when operating in *Automatic* mode). The available options for each of the three Alarms Out are:

- 1 – Activate if Alarm In 1 turns ON.
- 2 – Activate if Alarm In 2 turns ON.
- 3 – Activate if Alarm In 3 turns ON.
- 4 – Activate if Alarm In 4 turns ON.
- 5 - Activate if Alarm In 5 (GPS Antenna Status) turns ON
- 6 - Not Applicable (Alarm In 6 is not defined)
- 7 - Activate if Alarm In 7 (PS1Over Temperature) turns ON
- 8 - Activate if Alarm In 8 (PS2 Over Temperature) turns ON
- 9 - Activate if Alarm In 9 (PS1 Power) turns ON
- 10 - Activate if Alarm In 10 (PS2 Power) turns ON
- N – None (never activate this Alarm Out).
- A - Activate if ANY of the Alarms In turns ON.

The default for all three Alarms Out is **0 (None – never activate the alarm)**.

Alarms Out Control

The *Alarms Out Control* menu allows the functionality of the Alarms Out control mechanism to be defined. Its main purpose is to support "manual" activation/deactivation of each of the Alarms Out either locally or remotely using Telnet or SNMP. For each of the three Alarms Out, the following control options are available:

- 0 – Turn Alarm OFF (even if it should be ON according to the definition in the Automatic Alarms Out Definition Menu).
- 1 – Turn Alarm ON (even if it should be OFF according to the definition in the Automatic Alarms Out Definition Menu).
- 2 – Automatic (activate/deactivate according to the definition in the Automatic Alarms Out Definition Menu).

The default for all three Alarms Out is **2 (Automatic)**.

Show Alarm Parameters

Shows the current values of the Alarms In and Alarms Out parameters as well as their current status:

- **Alarms In Names And Status**

  Displays the names and current status (ON or OFF) for all Alarm In indications, including "internal" alarms, as follows:

  - Alarm In 1 through Alarm In 4: Name according to the name defined in the Alarms In Names Menu.
  - Alarm In 5: GPS Antenna Status.
  - Alarm In 6: NA (reserved for future use).
  - Alarm In 7: PS1 Over Temperature (over temperature indication for BS-PS Power Supply module 1, which is the module inserted in the left-most slot of the chassis).
  - Alarm In 8: PS2 Over Temperature (over temperature indication for BS-PS Power Supply module 2, which is the module inserted in the right-most slot of the chassis).
  - Alarm In 9: PS1 Power (power fail indication for BS-PS Power Supply module 1, which is the module inserted in the left-most slot of the chassis).
  - Alarm In 10: PS2 Power (power fail indication for BS-PS Power Supply module 2, which is the module inserted in the right-most slot of the chassis).

NOTE:

In some installations only one Power Supply module (either PS1 or PS2) may be used.

- **Alarms Out Names, Definitions, Control and Status**

  Displays the following information for each of the three Alarms Out:

  - Name: Name according to the name defined in the Alarms In Names Menu.
  - Definition: NONE, Alarm In # or ANY, according to the configuration in the Automatic Alarms Out Definition Menu.
  - Control: OFF, ON or AUTO, according to the configuration in the Alarms Out Control Menu.
  - Status: ON or OFF.

BreezeACCESS V

Version 4.3

Revision 4.0

System Manual: Appendices

Appendix A:

Configuration Download/Upload

This appendix describes the method of configuring a large number of BreezeACCESS units at once.

The Configuration Download/Upload feature in BreezeACCESS units simplifies the task of remotely configuring a large number of units using TFTP protocol.

By downloading the configuration file to a PC it is possible to view all the parameters configured at the unit, as it is a plain text ASCII file.

It is necessary to edit the file by a using simple editor and to remove certain parameters or change their values prior to uploading the configuration to another unit.

When multiple configuration is performed (uploading the file to several units) it is recommended that only the relevant parameters be included in the file .

Each parameter is represented in the file by three fields:

- A symbolic string similar to the name of the parameter in the monitor program, followed by "=".
- The value of the parameters (using the same values that are used in the monitor program).
- A comment (optional). If used, it should start with a ";" character.

The unit will ignore an unknown parameter. In the case of a known parameter with an out of range value, the default value will be used.

Use the SNMP write community string (the default is "private") to define both the uploaded file (put) and the downloaded file (get):
`SnmpWriteCommunity.cfg`

The file should be transferred in ASCII mode.

Example:

To upload the configuration file using DOS based TFTP Client to an SU whose IP address is 206.25.63.65:
tftp 206.25.63.65 put Suconf private.cfg

To download the configuration file from the same unit:
tftp 206.25.63.65 get private.cfg Suconf

Appendix B: Software Version Loading Procedure

General

Firmware upgrades to the unit's FLASH memory are performed by a simple loading procedure using a TFTP application. Before performing an upgrade procedure, be sure you have the correct files and latest instructions.

NOTE:

Shutting down power to the unit before completion of the loading procedure may cause the unit to be inoperable.

Verify that you have IP connectivity to the unit to be loaded with a new version. Verify that the IP address of the PC from which you intend to perform the upgrade belongs to the same subnet as the unit to be upgraded (unless the unit is behind a router). If the unit is behind a router, verify that the unit is configured with the correct ***Default Gateway Address.***

To view the current IP parameters of the unit, use the monitor program by connecting the PC to the unit either directly or via Telnet and use the following procedure:

1. From the *Main Menu* select ***1 – Info Screens.***

   The *Info Screens* menu opens.

2. From the *Info Screen* menu select ***2 – Show Basic Configuration***.

   A display of the current configuration of the basic parameters appears, including the ***IP Address***, ***Subnet Mask*** and ***Default Gateway Address*** parameters.

To configure any of the IP parameters, use the following procedure:

1. From the *Main Menu* select ***3 – Basic Configuration***.

   The *Basic Configuration* menu opens.

2. To configure the IP Address, select: ***1 – IP Address***.
3. To configure the Subnet Mask, select ***2 – Subnet Mask***.
4. To configure the Default Gateway Address select ***3 – Default Gateway Address***.
5. Reset the unit in order for the new configuration to apply.

6. To verify the connection, ping the unit's IP address. Verify that ping replies are being received.

The procedure to be used depends on the unit's FLASH memory type.

Identify the FLASH memory type by using the monitor program, connecting the PC to the unit either directly or via Telnet.

From the *Main Menu*, select ***1 – Info Screens***. From the *Info Screen* menu select ***1 – Show Unit Status***. The last line of the Unit Status display will indicate the FLASH type (type F or type S).

Use the TFTP utility, with the following syntax, to perform the upgrade:

```
tftp –i hostaddress put sourcefile [destinationfile]
```

Where **`-i`** is for binary mode, **`hostaddress`** is the IP address of the unit to be upgraded, **`put`** defines that the PC (client) will send a file to the hostaddress and **`destinationfile`** is the name of the file to be loaded.

Loading an Upgrade to a Unit with FLASH Type: F

Use the following table to determine which source file name to use, according to the unit's type.

Unit Type	Source File Name
AU	AXF.BS
SU	AXF.SU
SU with Voice	AXF.SUV
GU	AXF.GU

X, refers to the software version number, up to 5 decimal digits (e.g. for software release 4.0.40, X=4040).

Use the SNMP write community <SnmpWriteCommunity>.dwn (the default write community is `private`) to define the destination filename.

For example, to load the upgrade file A3011F.BS to an AU whose IP address is 206.25.63.65 use the following syntax:

```
tftp –i 206.25.63.65 put A3011F.BS private.dwn
```

NOTE:

If you are upgrading a Subscriber Unit which is not associated with an AU, the unit will reset every five minutes (approximately) and the following message will be displayed:

`FTL: file src\wpscan.c line 262 Too large number of scanning attempts`

The unit will reset and it will take more than a minute before you can re-establish the connection to it. You should either have the SU associated with an AU before starting the loading process or complete the loading process before the unit resets. Otherwise you will have to try again until you complete the loading process.

When version loading is completed the following message is displayed:

`Loading operation has been completed successfully`

The FLASH memory can store two software versions. One version is called *Current* and the second version is called *Shadow*. The new version is loaded into the Shadow (backup) FLASH memory.

To check that the new firmware was loaded properly, view the firmware versions stored in the FLASH using the following procedure:

1. From the *Main Menu*, select ***2 – Unit Control***.

   The Unit Control menu opens.

2. From the *Unit Control* menu, select ***5 – Flash Memory Control***.

   The *Flash Memory Control* menu opens.

3. From the *Flash Memory Control* menu, select ***S – Show Flash Versions***.

   The display appears as follows:

```
Flash Versions
==========
Current Version:  3.0.39
Shadow Version:   4.0.40
Version After Reset:3.0.39
```

From the *Flash Memory Control* menu select the active software version, using the following procedures:

To activate the backup (shadow) version:

1. From the *Flash Memory Control* menu select ***1 - Reset and Boot from Shadow Version***.

   The *Reset and Boot from Shadow Version* menu opens.

2. Select ***1 – Reset Now*** and press ENTER.

3. The unit resets and the Shadow version is used as the newactive version. Note that after the next reset, the Current version will be activated again.

If the active version is the Shadow version and you wish to continue using it after the next Reset, use the following procedure:

1. From the *Flash Memory Control* menu select *2 -* ***Use Current Version After Reset***.

   The *Use Current Version After Reset* menu opens.

2. Select ***1 – Set As Default Now*** and press **ENTER**. This will actually cause the names of the two versions to switch. The previous Shadow version will now be called Current and vise versa. The following message will be displayed:

   `UP (DOWN) Image FLASH will be operational` (UP or DOWN refers to the location in the flash memory).

The loading procedure is protected. An attempt to load an invalid version (e.g. using <SnmpWriteCommunity>.fmr when trying to load a new version to units with a FLASH Type: F) will be rejected.

Loading an Upgrade to a Unit with FLASH Type: S

Use the following table to determine which source file name to use, according to the unit's type.

Unit Type	File Name
AU	AXS.BS
SU	AXS.SU
SU with Voice	AXS.SUV
GU	AXS.GU

X refers to the software version number, up to 5 decimal digits (e.g. for software release 4.0.40, X=4040).

Use the SNMP write community <SnmpWriteCommunity>.fmr (default write community is `private`) to define the destination filename. For example: to load the upgrade file A3011S.SU to an SU whose IP address is 206.25.63.55 use the following syntax:

```
>tftp –i 206.25.63.55 put A3011S.SU private.fmr
```

NOTE:

If you are upgrading a Subscriber Unit which is not associated with an AU, the unit will reset every five minute (approximately) and the following message will be displayed:

`FTL: file src\wpscan.c line 262 Too large number of scanning attempts`

The unit will reset and it will take more than a minute before you can re-establish the connection to it. You should either have the SU associated with an AU before starting the loading process or complete the loading process before the unit resets. Otherwise you will have to try again until you complete the loading process.

When loading is completed the following message is displayed: **`Loading operation has been completed successfully.`**

The FLASH memory can store two software versions. One version is called *Current* and the second version is called *Shadow*. The new version is loaded into the Shadow (backup) FLASH memory.

To check that the new firmware was loaded properly, view the firmware versions stored in the FLASH using the following procedure:

1. From the *Main Menu*, select ***2 – Unit Control***.

   The Unit Control menu opens.

2. From the *Unit Control* menu, select ***5 – Flash Memory Control***.

   The *Flash Memory Control* menu opens.

3. From the *Flash Memory Control* menu, select ***S – Show Flash Versions***.

   The display appears as follows:

```
Flash Versions
==========
Current Version:  3.0.39
Shadow Version:   4.0.40
Version After Reset:3.0.39
```

From the *Flash Memory Control* menu select the active software version, using the following procedures:

To activate the backup (shadow) version:

1. From the *Flash Memory Control* menu select ***1 - Reset and Boot from Shadow Version***.

   The *Reset and Boot from Shadow Version* menu opens.

2. Select ***1 – Reset Now*** and press ENTER.

3. The unit resets and the Shadow version is used as the newactive version. Note that after the next reset, the Current version will be activated again.

If the active version is the Shadow version and you wish to continue using it after the next Reset, use the following procedure:

1. From the *Flash Memory Control* menu select *2* - ***Use Current Version After Reset***.

   The *Use Current Version After Reset* menu opens.

2. Select ***1 – Set As Default Now*** and press ENTER. This will actually cause the names of the two versions to switch. The previous Shadow version will now be called Current and vise versa. The following message will be displayed:

   `UP (DOWN) Image FLASH will be operational` (UP or DOWN refers to the location in the flash memory).

The loading procedure is protected. An attempt to load an invalid version (e.g. using <SnmpWriteCommunity>.fmr when trying to load a new version to units with a FLASH Type: S) will be rejected.

Appendix C: Supported MIBs and Traps

BreezeACCESS agents support the following MIBs:

- MIB-II (RFC1213)
- BRIDGE-MIB (RFC1286)
- BreezeCOM brzAccessMib
- BreezeCOM brzPhoneMib
- BreezeCOM brznetmib

BreezeACCESS System Object Identifiers

Path:
breezecom OBJECT IDENTIFIER =1.3.6.1.4.1.710
{(iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) breezecom(710)}

breezecomNewOID OBJECT IDENTIFIER = 1.3.6.1.4.1.710.10
{breezecom 10}

breezecomBreezeACCESSproducts OBJECT IDENTIFIER = 1.3.6.1.4.1.710.10.2
{breezecomNewOID 2}

breezecomBreezeACCESS_ACCESS OBJECT IDENTIFIER = 1.3.6.1.4.1.710.10.2.1
{breezecomBreezeACCESSproducts 1}

breezecomBreezeACCESS_General OBJECT IDENTIFIER = 1.3.6.1.4.1.710.10.2.2
{breezecomBreezeACCESSproducts 2}

Object	OID (Location in parenthesis)	Description
breezecomSU_AE_1D	breezecomBreezeACCESS_ACCESS 1 (710.10.2.1.1)	SU-A/E-1D
breezecomSU_AE_8D	breezecomBreezeACCESS_ACCESS 2 (710.10.2.1.2)	SU-A/E-8D
breezecomSU_AE_BD	breezecomBreezeACCESS_ACCESS 3 (710.10.2.1.3)	SU-A/E-BD
breezecomSU_AE_1D1V	breezecomBreezeACCESS_ACCESS 4 (710.10.2.1.4)	SU-A/E-1D1V
breezecomSU_AE_8D1V	breezecomBreezeACCESS_ACCESS 5 (710.10.2.1.5)	SU-A/E-8D1V
breezecomSU_AE_BD1V	breezecomBreezeACCESS_ACCESS 6 (710.10.2.1.6)	SU-A/E-BD1V
breezecomSU_I_1D	breezecomBreezeACCESS_ACCESS 7 (710.10.2.1.7)	SU-I-1D
breezecomSU_I_8D	breezecomBreezeACCESS_ACCESS 8 (710.10.2.1.8)	SU-I-8D
breezecomSU_I_BD	breezecomBreezeACCESS_ACCESS 9 (710.10.2.1.9)	SU-I-BD
breezecomSU_I_1D1V	breezecomBreezeACCESS_ACCESS 10 (710.10.2.1.10)	SU-I-1D1V
breezecomSU_I_8D1V	breezecomBreezeACCESS_ACCESS 11 (710.10.2.1.11)	SU-I-8D1V
breezecomSU_I_BD1V	breezecomBreezeACCESS_ACCESS 12 (710.10.2.1.12)	SU-I-BD1V
breezecomSU_R_1D	breezecomBreezeACCESS_ACCESS 13 (710.10.2.1.13)	SU-R-1D
breezecomSU_R_8D	breezecomBreezeACCESS_ACCESS 14 (710.10.2.1.14)	SU-R-8D
breezecomSU_R_BD	breezecomBreezeACCESS_ACCESS 15 (710.10.2.1.15)	SU-R-BD
breezecomSU_R_1D1V	breezecomBreezeACCESS_ACCESS 16 (710.10.2.1.16)	SU-R-1D1V
breezecomSU_R_8D1V	breezecomBreezeACCESS_ACCESS 17 (710.10.2.1.17)	SU-R-8D1V
breezecomSU_R_1D1V	breezecomBreezeACCESS_ACCESS 18 (710.10.2.1.18)	SU-R-BD1V
breezecomAU_NI	breezecomBreezeACCESS_ACCESS 19 (710.10.2.1.19)	AU-NI
breezecomAU_BS	breezecomBreezeACCESS_ACCESS 20 (710.10.2.1.20)	AU-BS

Object	OID (Location in parenthesis)	Description
breezecomAU_I	breezecomBreezeACCESS_ACCESS 21 (710.10.2.1.21)	AU-I
breezecomSU_BS	breezecomBreezeACCESS_ACCESS 22 (710.10.2.1.22)	SU-BS
breezecomAU_BS_WA	breezecomBreezeACCESS_ACCESS 23 (710.10.2.1.23)	AU-BS-WA
breezecomGU_BS	breezecomBreezeACCESS_GENERAL 1 (710.10.2.2.1)	GU-BS

brzAccessMIB

Path:
breezecom OBJECT IDENTIFIER =1.3.6.1.4.1.710
{(iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) breezecom(710)}

breezecomPrvRev OBJECT IDENTIFIER = 1.3.6.1.4.1.710.3
{breezecom 3}

brzAccessMib OBJECT IDENTIFIER = 1.3.6.1.4.1.710.3.3
{breezecomPrvRev 3}

Note: ** is used instead of the brzacc prefix*

Service Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*ServiceParameters 710.3.3.1 (brzAccessMib 1)	MIR/CIR Parameters.	
*MirCirOption 710.3.3.1.1 (*ServiceParameters 1)	Applicable to SU and AU only. The setting in the AU enables/disables the MIR/CIR support feature for all SUs served by the AU, regardless of the setting in the SU. The option exists in the SU only for compatibility with AUs running SW versions 3.X and lower, in which case the MIR/CIR support feature is controlled at the SU.	Integer disable (0) enable (1) na (255)
*MirAUtoSU 710.3.3.1.2 (*ServiceParameters 2)	Applicable to SU only. Sets the Maximum Information Rate (MIR) from AU to SU.	Integer 32–2200 (Kbps) Must be higher than *CirAUtoSU
*MirSUtoAU 710.3.3.1.3 (*ServiceParameters 3)	Applicable to SU only. Sets the Maximum Information Rate (MIR) from SU to AU.	Integer 32–2200 (Kbps) Must be higher than *CirSUtoAU
*CirAUtoSU 710.3.3.1.4 (*ServiceParameters 4)	Applicable to SU only. Sets the Committed Information Rate (CIR) from AU to SU.	Integer 0–2200 (Kbps) Must be lower than *MirAUtoSU
*CirSUtoAU 710.3.3.1.5 (*ServiceParameters 5)	Applicable to SU only. Sets the Committed Information Rate (CIR) from SU to AU.	Integer 0–2200 (Kbps) Must be lower than *MirSUtoAU
*MaxDelay 710.3.3.1.6 (*ServiceParameters 6)	Applicable to SU only. Sets the maximal time packets may be delayed by the CIR\MIR mechanism. Above the configured maximal period the packets are discarded.	Integer 300 – 10,000 (milliseconds)
*MaxBurstDuration 710.3.3.1.7 (*ServiceParameters 7)	Applicable to SU and AU. Sets the maximum time during which ìinactivity bonusî time can be accumulated for future burst transmissions.	Integer 0 – 2000 (milliseconds)
*GracefulDegradationLimit 710.3.3.1.8 (*ServiceParameters 8)	Applicable to AU only. Sets the maximum limit for activating the graceful degradation algorithm.	Integer 0 – 70 (%)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*RunTimeMirCirOption 710.3.3.1.9 (*ServiceParameters 9)	Applicable to SU only. Indicates the actual status of the MIR/CIR option, which may be different from the setting of this parameter in the SU since it is controlled by the AU.	Integer disable (0) enable (1) na (255)
*MirOnlyOption 710.3.3.1.10 (*ServiceParameters 10)	Applicable only to AU when CIR/MIR option is enabled. When enabled, the MIR/CIR algorithm fo determining the actual information rate is overridden and operates only with the configured MIR values. The graceful degradation algorithm is disabled.	disable (0) enable (1) na (255)

RADIUS General Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*RadiusGeneralParameters_ 710.3.3.22 (brzAccessMib 22)	Applicable to SU only. General RADIUS parameters.	
*RadiusUserName 710.3.3.22.1 (*RadiusGeneralParameters 1)	Applicable to SU only. A string that is used as the User Name when communicating with the RADIUS server.	DisplayString (SIZE(64)) Up to 64 printable ASCII characters, case sensitive.
*RadiusUserPassword 710.3.3.22.2 (*RadiusGeneralParameters 2)	Applicable to SU only. A string that is used as the User Password when communicating with the RADIUS server. Accessible only with SNMP Write Community.	DisplayString (SIZE(64)) Up to 64 printable ASCII characters, case sensitive.
*RadiusSharedSecret 710.3.3.22.3 (*RadiusGeneralParameters 3)	Applicable to SU only. A string that is used to encrypt the User Password when communicating with the RADIUS server. Accessible only with SNMP Write Community.	DisplayString (SIZE(20) Up to 20 printable ASCII characters, case sensitive.

Accounting Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
***AccountingParameters** 710.3.3. 3 (brzAccessMib 3)	Applicable to SU only. Accounting parameters.	
*AccountingOption 710.3.3.3.1 (*AccountingParameters 1)	Applicable to SU only. Enables or disables the transmission of accounting records to a Radius Server.	Integer disable (0) enable (1) na (255)
*RadiusServerAccounting IpAddress 710.3.3.3.2 (*AccountingParameters 2)	Applicable to SU only. IP Address of the Accounting RADIUS server.	IP address
*AccountingInterval 710.3.3.3.3 (*AccountingParameters 3)	Applicable to SU only. Maximum interval, in seconds, between consecutive transmissions of accounting records.	Integer 60–6000 (seconds)
*RadiusServerAccountingPort 710.3.3.3.4 (*AccountingParameters 4)	Applicable to SU only. The accounting port of the RADIUS server.	Integer 1000 – 65535 na (255)

RADIUS Authentication Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*RadiusAuthParameters 710.3.3. 21 (brzAccessMib 21)	Applicable to SU only. RADIUS Authentication parameters.	
*RadiusAuthOption 710.3.3. 21.1 (*RadiusAuthParameters 1)	Applicable to SU only. Enables or disables the RADIUS Authentication support feature.	Integer disable (0) enable (1) na (255)
* RadiusServerAuthIpAddress 710.3.3. 21.2 (*RadiusAuthParameters 2)	Applicable to SU only. IP Address of the authentication RADIUS server.	IP address
*RadiusServerAuthPort 710.3.3. 21.3 (*RadiusAuthParameters 3)	Applicable to SU only. The authentication port of the RADIUS server.	Integer 1000 – 65535 na (255)
*RadiusAuthenticationStatus 710.3.3. 21.3 (*RadiusAuthParameters 3)	Applicable to SU only. A read-only status of the authentication process.	Integer idle (0) sendingRequest (1) waitForResponse(2) sendingChallenge(3) authenticated (4) rejected (5)

User Filtering Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*UserFilterParams 710.3.3. 2 (brzAccessMib 2)	Applicable to SU only. User Filtering parameters.	
*UserFilterOption 710.3.3.2.1 (*UserFilterParams 1)	Applicable to SU only. Defines user-filtering options. disable: No filtering. iPOnly: Only IP protocol frames pass. userDefinedAddrOnly: Only IP messages to/from user defined IP addresses pass. pPPoE Only: Only PPPoE frames pass.	Integer disable (0) iPOnly (1) userDefinedAddrOnly(2) pPPoEOnly (3) na (255)
*IpFilterTable 710.3.3.2.2 (*UserFilterParams 2)	Applicable to SU only. An IP Filter Table of up to 8 user defined addresses, or address groups, to be used if the selected User Filtering option is **userDefinedAddrOnly**. Not accessible.	
*IpFilterEntry 710.3.3.2.2.1 (*IpFilterTable 1)	Applicable to SU only. An IP Filter Table entry. Not accessible.	
*IpID 710.3.3.2.2.1.1 (*IpFilterEntry 1)	Applicable to SU only. An IP address of an IP Filter Table entry.	IP Address
*MaskID 710.3.3.2.2.1.2 (*IpFilterEntry 2)	Applicable to SU only. An IP Mask of an IP Filter Table entry. Either a mask or a range, but not both can be used to define an address group.	IP Address
*IpFilterRange 710.3.3.2.2.1.3 (*IpFilterEntry 3)	Applicable to SU only. An addresses range for the IP Filter Table entry. The first address in the range is the IP address (*iPID). Either a mask or a range, but not both can be used to define an address group.	Integer 0 - 255
*IpFilterIdx 710.3.3.2.2.1.4 (*IpFilterEntry 4)	Applicable to SU only. Read-only. A table index for the IP Filter Table entry.	Integer 1-8

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*DeleteOneUserFilter 710.3.3.2.3 (*UserFilterParams 3)	Applicable to SU only. Deletes a single selected entry from the IP Filter Table.	Integer off (0) firstEntry (1) secondEntry (2) thirdEntry (3) fourthEntry (4) fifthEntry (5) sixthEntry (6) seventhEntry (7) eighthEntry (8) na (255)
*DeleteAllUserFilters 710.3.3.2.4 (*UserFilterParams 4)	Applicable to SU only. Deletes all entries from the IP Filter Table.	Integer off (0) deleteAll (1) off (2) na (255)

Network Management Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*NwMngParameters 710.3.3. 4 (brzAccessMib 4)	Network Management parameters.	
*AccessToNwMng 710.3.3. 4.1 (*NwMngParameters 1)	Applicable to AU and SU. The port to be used for remote management. wlanOnly: Management E from Wireless port only. ethOnly: Management enabled from Ethernet port only. bothWlanEth: Management enabled from both Wireless and Ethernet ports.	Integer wlanOnly (0) ethOnly (1) bothWlanEth (2) na (255)
*NwMngFilter 710.3.3. 4.2 (*NwMngParameters 2)	Applicable to AU, SU and GU. Disables or enables IP address based filtering of management messages (SNMP/Telnet/ TFTP) on one of the ports, or on both ports. In GU only disable and activateOnEthPort options are available.	Integer disable (0) activateOnEthPort (1) activateOnWlanPort (2) activateOnBothWlanAndEth(3) na (255)
mngIpFilterTable 710.3.3. 4.3 (*NwMngParameters 3)	Applicable to AU, SU and GU. A Management IP Filter Table of up to 3 IP addresses of devices that are authorized to access the unit for management purposes. Not accessible.	
mngIpFilterEntry 710.3.3. 4.3.1 (mngIpFilterTable 1)	Applicable to AU, SU and GU. A Management IP Filter Table entry. Not accessible.	
*NwMngIpAddress 710.3.3. 4.3.1.1 (mngIpFilterEntry 1)	Applicable to AU, SU and GU. An IP address in the Management IP Filter Table.	IP address
*NwMngIpTableIdx 710.3.3. 4.3.1.2 (mngIpFilterEntry 2)	Applicable to AU, SU and GU. Read-only. A table index for an entry in the Management IP Filter Table.	Integer 1-3
*DeleteOneNwIpAddr 710.3.3. 4.4 (*NwMngParameters 4)	Applicable to AU, SU and GU. Deletes a single selected entry from the Management IP Filter Table.	Integer off (0) firstEntry (1 secondEntry (2) thirdEntry (3) na (255)
*DeleteAllNwIpAddrs 710.3.3. 4.5 (*NwMngParameters 5)	Applicable to AU, SU and GU. Deletes all entries from the Management IP Filter Table.	Integer off (0) on (1) na (255)
*AccessToNwTrap 710.3.3. 4.6 (*NwMngParameters 6)	Applicable to AU, SU and GU. Enables or disables sending of SNMP traps.	Integer disable (0) enable (1)
mngTrapTable 710.3.3. 4.7 (*NwMngParameters 7)	Applicable to AU, SU and GU. A Management Trap Table of up to 3 IP addresses of devicess to send traps to. Not accessible.	
mngTrapEntry 710.3.3. 4.7.1 (mngTrapTable 1)	Applicable to AU, SU and GU. A Management Trap Table entry. Not accessible.	
*NwMngTrapCommunity 710.3.3. 4.7.1.1 (mngTrapEntry 1)	Applicable to AU, SU and GU. The trap community associated with the applicable entry in the Management Trap Table.	DisplayString (SIZE(14)) Up to 14 printable ASCII characters, case sensitive.
*NwMngTrapAddress 710.3.3. 4.7.1.2 (mngTrapEntry 2)	Applicable to AU, SU and GU. An IP address in the Management Trap Table entry.	IP address
*NwMngTrapTableIdx 710.3.3. 4.7.1.3 (mngTrapEntry 3)	Applicable to AU, SU and GU. Read only. Tables Index for an entry in the Management Trap Table.	Integer 1-3
*DeleteOneTrapAddr 710.3.3. 4.8 (*NwMngParameters 8)	Applicable to AU, SU and GU. Deletes a single selected entry from the Management Trap Table.	Integer off (0) firstEntry (1) secondEntry (2) thirdEntry (3) na (255)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*DeleteAllTrapAddrs 710.3.3.4.9 (*NwMngParameters 9)	Applicable to AU, SU and GU. Deletes all entries from the Management Trap Table.	Integer 0=off 1=on 2=off 255=na
*PerTrapControl 710.3.3.4.10 (*NwMngParameters 10)	Applicable to AU, SU and GU. Per Trap Control parameters.	
*SendSUAssociatedAUTrap 710.3.3.4.10.1 (*PerTrapControl 1)	Applicable to AU only. Enables\Disables the sending of brzaccSUassociatedAUTRAP.	Integer disable (0) enable (1)
*SendAUDissassociatedTrap 710.3.3.4.10.2 (*PerTrapControl 2)	Applicable to AU only. Enables\Disables the sending of brzaccAUdisassociatedTRAP.	Integer disable (0) enable (1)
*SendAUAgingTrap 710.3.3.4.10.3 (*PerTrapControl 3)	Applicable to AU only. Enables\Disables the sending of brzaccAUagingTRAP.	Integer disable (0) enable (1)
*SendAUWirelessQualityTrap 710.3.3.4.10.4 (*PerTrapControl 4)	Applicable to AU only. Enables\Disables the sending of brzaccAUwirelessQualityTRAP.	Integer disable (0) enable (1)
*SendSUAssociatedTrap 710.3.3.4.10.5 (*PerTrapControl 5)	Applicable to SU only. Enables\Disables the sending of brzaccSUassociatedTRAP.	Integer disable (0) enable (1)
*SendSUWirelessQualityTrap 710.3.3.4.10.6 (*PerTrapControl 6)	Applicable to SU only. Enables\Disables the sending of brzaccSUwirelessQualityTRAP.	Integer disable (0) enable (1)
*SendParameterChangedTrap 710.3.3.4.10.7 (*PerTrapControl 7)	Applicable to SU and AU. Enables\Disables the sending of brzaccParameterChangedTRAP.	Integer disable (0) enable (1)
*SendGPSAlarmInTrap 710.3.3.4.10.8 (*PerTrapControl 8)	Applicable to GU only. Enables\Disables the sending of brzaccGpsAlarmInTRAP.	Integer disable (0) enable (1)
*SendGPSAlarmOutTrap 710.3.3.4.10.9 (*PerTrapControl 9)	Applicable to GU only. Enables\Disables the sending of brzaccGpsAlarmOutTRAP.	Integer disable (0) enable (1)
*SendGPSUTCstatusTrap 710.3.3.4.10.10 (*PerTrapControl 10)	Applicable to GU only. Enables\Disables the sending of brzaccGpsUTCstatusTRAP.	Integer disable (0) enable (1)
*SendPowerUpFromResetTrap 710.3.3.4.10.11 (*PerTrapControl 11)	Applicable to AU, SU and GU. Enables\Disables the sending of brzaccPowerUpFromResetTRAP.	Integer disable (0) enable (1)
*SendMonitorStatusTrap 710.3.3.4.10.12 (*PerTrapControl 12)	Applicable to AU, SU and GU. Enables\Disables the sending of brzaccMonitorStatusTRAP.	Integer disable (0) enable (1)
*SendColdOrWarmStartTrap 710.3.3.4.10.13 (*PerTrapControl 13)	Applicable to AU, SU and GU. Enables\Disables the sending of Generic Start (Cold\Warm) Trap.	Integer disable (0) enable (1)
*SendAULossOfSyncTrap 710.3.3.4.10.14 (*PerTrapControl 14)	Applicable to BS-AU in slave mode only. Enables\Disables the sending of brzaccAULossOfSyncTRAP.	Integer disable (0) enable (1)
*SendAUAlarmsTraps 710.3.3.4.10.15 (*PerTrapControl 15)	Applicable to IF-based AU. Enables\Disables the sending of all AU Alarms traps.	Integer disable (0) enable (1)

Bridge Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*BridgeParameters 710.3.3. 5 (brzAccessMib.5)	Bridge parameters.	
*EthBroadcastFiltering 710.3.3. 5.1 (*BridgeParameters 1)	Applicable to SU only. Enables/disables the filtering of Ethernet (layer2) broadcasts. disable: No filtering. ethOnly: Filter broadcasts received on the Ethernet port only. wlanOnly: Filter broadcasts received on the Wlan port only. bothWlanAndEth: Filter broadcasts received on both ports.	Integer disable (0) ethOnly (1) wlanOnly (2) bothWlanAndEth(3) na (255)
*VLANSupport 710.3.3. 5.2 (*BridgeParameters 2)	Applicable to AU, SU and GU. VLAN Support Parameters.	
*VlanID 710.3.3. 5.2.1 (*VLANSupport 1)	Applicable to SU only. VLAN ID for data frame tagging. Applicable to Access Link only.	Integer 1-4094. 0 means not applicable
*EthernetLinkType 710.3.3. 5.2.2 (*VLANSupport 2)	Applicable to AU and SU. VLAN support mode (Link Type). The Access Link option is not available for AU.	Integer accessLink (1) trunkLink (2) hybridLink (3)
*ManagementVID 710.3.3. 5.2.5 (*VLANSupport 5)	Applicable to AU, SU and GU. VLAN ID for management frame tagging. For SUs with voice support it is also used for tagging voice frames (RTP packets).	Integer 1-4094 65535 means no VLAN tagging.
*VoicePriorityTag 710.3.3. 5.2.6 (*VLANSupport 6)	Applicable to SU with voice only. Enables prioritization tagging of voice (RTP) frames according to IEEE 802.1p when *ManagementVID is 65535 (No VLAN).	Integer disable (0) enable (1) na (255)
*VLANForwarding 710.3.3. 5.2.7 (*VLANSupport 7)	VLAN Forwarding Feature Parameters	
*VlanForwardingSupport 710.3.3. 5.2.7.1 (*VLANForwarding 1)	Applicable to AU and SU. Enables or disables VLAN Forwarding. (applicable in Trunk links only)	Integer disable (0) enable (1) na (255)
*VlanForwardingTable 710.3.3. 5.2.7.2 (*VLANForwarding 2)	Applicable to AU and SU. A VLAN Forwarding Table of up to 20 VLAN IDs of devices to which data frames are forwarded when VLAN Forwarding is Enabled. (applicable in Trunk links only). Not accessible.	
*VlanForwardingEntry 710.3.3. 5.2.7.2.1 (*VlanForwardingTable 1)	Applicable to AU and SU. A VLAN Forwarding Table entry. (applicable in Trunk links only). Not accessible.	
*VlanForwardingIdx 710.3.3. 5.2.7.2.1.1 (*VlanForwardingEntry 1)	Applicable to AU and SU. A read only table index for a VLAN entry in the VLAN Forwarding Table.	Integer 1 - 20
*VlanIdForwarding 710.3.3. 5.2.7.2.1.2 (*VlanForwardingEntry 2)	Applicable to AU and SU. The list of VLAN ID's in the VLAN ID Forwarding Table. To Remove a VLAN ID - SET the corresponding entry to 0. To Add a new VLAN ID SET an entry which is currently 0.	Integer 1-4094 0=remove entry.
*VLANRelaying 710.3.3. 5.2.8 (*VLANSupport 8)	VLAN Relaying Feature Parameters	
*VlanRelayingSupport 710.3.3. 5.2.8.1 (*VLANRelaying 1)	Applicable to AU only. Enables or disables VLAN Relaying. (applicable in Trunk links only)	Integer disable (0) enable (1) na (255)
*VlanRelayingTable 710.3.3. 5.2.8.2 (*VLANRelaying 2)	Applicable to AU only. A VLAN Relaying Table of up to 20 VLAN IDs of devices to which data frames are relayed when VLAN Relaying is Enabled. (applicable in Trunk links only). Not accessible.	

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*VlanRelayingEntry 710.3.3. 5.2.8.2.1 (*VlanRelayingTable 1)	Applicable to AU only. A VLAN Relaying Table entry. (applicable in Trunk links only). Not accessible.	
*VlanRelayingIdx 710.3.3. 5.2.8.2.1.1 (*VlanRelayingEntry) 1	Applicable to AU only. A read only table index for a VLAN entry in the VLAN Relaying Table.	Integer 1 - 20
*VlanIdRelaying 710.3.3. 5.2.8.2.1.2 (*VlanRelayingEntry 2)	Applicable to AU only. The list of VLAN ID's in the VLAN ID Relaying Table. To Remove a VLAN ID - SET the corresponding entry to 0. To Add a new VLAN ID SET an entry which is currently 0.	Integer 1-4094 0=remove entry.
*VLANTrafficPriority 710.3.3. 5.2.9 (*VLANSupport 9)	VLAN Traffic Priority Parameters	
*VlanDataPriority 710.3.3. 5.2.9.1 (*VLANTrafficPriority 1)	Applicable to SU only. Priority tagging for data frames. Applicable to Access Link only.	Integer 0 – 7 na (255)
*VlanVoicePriority 710.3.3. 5.2.9.2 (*VLANTrafficPriority 2)	Applicable to SU with voice only. Priority tagging for voice frames. Applicable to Access Link and Trunk Link only.	Integer 0 – 7 na (255)
*VlanManagementPriority 710.3.3. 5.2.9.3 (*VLANTrafficPriority 3)	Applicable to AU, SU and GU. Priority tagging for management frames. Applicable to units with a *ManagementVID other than 65535.	Integer 0 – 7 na (255)
*PriorityQueueThreshold 710.3.3. 5.2.9.4 (*VLANTrafficPriority 4)	Applicable to AU and SU. Priority threshold for tagged frames received from Ethernet port. Applicable to Hybrid Link and Trunk Link only.	Integer 0 – 7 na (255)
*BridgeAgingTime 710.3.3. 5.3 (*BridgeParameters 3)	Applicable to AU and SU. Bridge aging time for devices learned from both the Ethernet and wireless link ports.	Integer 100 – 2000 (seconds)
*LanToWirelessLinkBridgeMode 710.3.3. 5.4 (*BridgeParameters 4)	Applicable to AU only. Controls the flow of information from Ethernet to Wlan. rejectUnknown: Permits only transmission to addresses known to be on the Wlan side. forwardUnknown: Forwards all frames, except those sent to addresses known to be on the Ethernet side.	Integer rejectUnknown (0) forwardUnknown (1) na (255)
*BroadcastRelaying 710.3.3. 5.5 (*BridgeParameters 5)	Applicable to AU only. Enables/disables the relaying of broadcast messages to the wireless link.	Integer disable (0) enable (1) na (255)
*UnicastRelaying 710.3.3. 5.6 (*BridgeParameters 6)	Applicable to AU only. Enables/disables the relaying of unicast messages to the wireless link.	Integer disable (0) enable (1) na (255)
*EthBroadcastingParameters 710.3.3. 5.7 (*BridgeParameters 7)	Applicable to SU only. Ethernet Broadcasting parameters.	
*DHCPBroadcastOverrideFilter 710.3.3. 5.7.1 (*EthBroadcastingParameters 1)	Applicable to SU only. Enables or disables the broadcasting of DHCP messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option	Integer no (0) yes (1) na (255)
* PPPoEBroadcastOverrideFilter 710.3.3. 5.7.2 (*EthBroadcastingParameters 2)	Applicable to SU only. Enables or disables the broadcasting of PPPoE messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer no (0) yes (1) na (255)
* ARPBroadcastOverrideFilter 710.3.3. 5.7.3 (*EthBroadcastingParameters 3)	Applicable to SU only. Enables or disables the broadcasting of ARP messages, overriding the general *EthBroadcastFiltering Ethernet broadcast filtering option.	Integer no (0) yes (1) na (255)
*ToSPriorityParameters 710.3.3. 5.8 (*BridgeParameters 8)		
*VoicePacketsToS 710.3.3. 5.8.1 (*ToSPriorityParameters 1)	Applicable to SU with voice only. The Type of Service value to be inserted in the IP header of voice (RTP) packets.	Integer 0-255
*ToSPrecedenceThreshold 710.3.3. 5.8.2 (*ToSPriorityParameters 2)	Applicable to SU and AU only. Priority threshold (based on the ToS) for frames received from Ethernet port.	Integer 0-7

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*PortsControl 710.3.3. 5.9 (*BridgeParameters 9)	Applicable to SU only. Port Control parameters	
*EthernetPortControl 710.3.3. 5.9.1 (*PortsControl 1)	Applicable to SU only. Enable/disable the Ethernet port. When disabled, only data frames are blocked. Management frames are accepted.	Integer disable (0) enable (1)
*VoicePortControl 710.3.3. 5.9.2 (*PortsControl 2)	Applicable to SU with voice only. Enable/ disable the voice port.	Integer disable (0) enable (1)

Air Interface Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*AirInterface 710.3.3. 6 (brzAccessMib 6)		
*ESSID 710.3.3. 6.1 (*AirInterface 1)	Applicable to SU and AU. The Extended Service Set ID (ESSID) used to prevent the merging of collocated systems. Accessible only with SNMP Write Community.Can be viewed (get) with the SNMP Read Community only if *SNMPReadESSID is enabled.	DisplayString (SIZE(31)) Up to 31 printable case sensitive ASCII characters.
*AckDelayLimit 710.3.3. 6.2 (*AirInterface 2)	Applicable to SU and AU. Defines the maximum time the unit waits for a response message to a transmission (e.g. ACK, CTS, response during association process) before deciding that the transmission failed Defining a higher range causes the unit to wait a longer time for a response before retransmission. Low: Up to 10km Medium: Up to 20km High: Greater than 20km.	Integer Low (0) Medium (1) High (2) na (255)
*FreqOffset 710.3.3. 6.3 (*AirInterface 3)	Applicable to SU and AU in BreezeACCESS XL and BreezeACCESS V 5..7GHz families. Not applicable to BreezeACCESS XL units that support only Flexible Hopping Definition for setting the hopping frequencies (e.g. 3.3a band). Not applicable in Flexible Hopping Definition mode. In BreezeACCESS XL it determines the beginning of the actual hopping band or single channel frequency relative to the beginning of the radio band. Start of hopping band (channel) = Start of radio band+2 X Frequency Offset. In BreezeACCESS V 5.7GHz operating in ISM US FCC or ISM International mode, it determines the shift in MHz of each channel's frequency relative to the channel's frequency in the basic hopping sequence.	Integer na (255) In BreezeACCESS XL the valid range of values is dependent on the bandwidth of the radio and on the selected Hopping Band. Max. Frequency Offset = [Overall radio bandwidth-Hopping Band]/2 In BreezeACCESS V 5.7GHz, the permitted range is 0 to 45 (MHz) in ISM US FCC mode and 0 to 70 (MHz) in ISM International mode.

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*TransmitDiversity 710.3.3. 6.4 (*AirInterface 4)	Applicable to SU-R, SU-I and AU-I units only. Enables the selection of the antenna(s) to be used for transmission.	Integer use2Antennasn (0) antenna1 (1) antenna2 (2) na (255)
*HoppingSequence 710.3.3. 6.5 (*AirInterface 5)	Applicable to AU in BreezeACCESS II family only. Determines the hopping sequence to be used. Different AUs in the same geographical area should use different Hopping Sequences from the same Hopping Set. The valid range is dependant on the Country Standard.	Integer Na (255) Australia: 1-20 Canada: 1-10 Europe ETSI: 1-26 France: 1-11 Israel: 1-11 Japan: 1-4 Korea: 1-4 Netherlands: 1-5 Spain: 1-9 US FCC: 1-26 Mexico: 1-10 International: 1-26
*HoppingSet 710.3.3. 6.6 (*AirInterface 6)	Applicable to AU in BreezeACCESS II family only. Determines the hopping set to be used. All AUs in the same geographical area should use the same Hopping Set.	Integer 1-3 na (255)
*HoppingSync 710.3.3. 6.7 (*AirInterface 7)	Applicable to BS-AU only. Inter-AU hopping sync functionality of the unit. In the BreezeACCESS II family, synchronization among AUs is not available with the following Country Standards: US FCC, Australia, Canada. In the BreezeACCESS V family, synchronization is not available if the selected hopping band is ISM US FCC.	Integer idle (0) slave (1) master (2) na (255)
*HoppingShift 710.3.3. 6.8 (*AirInterface 8)	Applicable to AU in BreezeACCESS V, XL and MMDS families and in BreezeACCESS II if *HoppingBands is frqFlexibleHopping. Defines a hopping pattern different from the basic hopping sequence (Hopping Shift=0). Different collocated AUs should use different hopping shifts.	Integer na (255) Range 0 to [number of operational channels-1]

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*HoppingBands 710.3.3. 6.9 (*AirInterface 9)	Applicable to SU and AU only. In BreezeACCESS II units set in the factory to “Country Standard Protected” this is read-only, showing the Country Standard set in the factory. In BreezeACCESS MMDS it is read-only, showing Flexible Hopping Definition. In BreezeACCESS XL products that support only Flexible Hopping Definition for setting the hopping frequencies (e.g. 3.3a band), it is read-only, showing Flexible Hopping Definition. In other BreezeACCESS XL products, supporting the use of the Hopping Band parameter for setting the hopping frequencies, this is read-write, enabling the selection of a fixed Hopping Band, Single Channel operation or Flexible Hopping Definition. In BreezeACCESS V units in the 5.7GHz band that are configured to support only ISM US FCC hopping standard, it is read-only. Otherwise it is read-write, supporting the selection of ISM US FCC, ISM International and Flexible Hopping Definition, In BreezeACCESS V units in the 5.2GHz band it is read-only, showing Flexible Hopping Definition.	Integer na (255) The available values represent settings that are dependent on the specific radio band. ***BreezeACCESS II (read only when configured in factory to “Country Standard Protected”):*** frqSiteProprietary (3) frqISMEuropeETSI (4) frqISMUsFCC (5) frqISMJapan (6) frqISMKorea (7) frqISMAustralia (8) frqISMIsrael (9) frqISMNetherlands (11) frqISMFrance (12) frqISMSpain (13) frqISMCanada (14) frqInternational (22) frqFlexibleHopping (37) frqSingleChannel2_4GHz (41) frqISMMexico (67) ***MMDS (read only):*** frqFlexibleHopping (37) ***BreezeACCESS 2.6b:*** frqFlexibleHopping (37) frq2_6GhzHoppingSequence10MHz (44) frq2_6GhzHoppingSequence12MHz (45) frq2_6GhzHoppingSequence14MHz (46) frq2_6GhzHoppingSequence24MHz (47) frq2_6GhzHoppingSequence28MHz (48) frq2_6GhzHoppingSequence36MHz (49) frq2_6GhzHoppingSequence42MHz (50) frqSingleChannel2_6Ghz (51) ***BreezeACCESS 3.3a, 3.5e, 3.6b: (read only)*** frqFlexibleHopping (37) ***BreezeACCESS 3.5a:*** frq3_5aGHzHoppingSequence10MHz (15) frq3_5aGHzHoppingSequence12MHz (16) frq3_5aGHzHoppingSequence14MHz (17) frq3_5aGHzHoppingSequence24MHz (18) frq3_5aGHzHoppingSequence28MHz (19) frq3_5aGHzHoppingSequence36MHz (20) frq3_5aGHzHoppingSequence42MHz (21) frqFlexibleHopping (37) frqSingleChannel3_5GHz (40) frq3_5aGHzHoppingSequence24MhzProprietary(69) ***BreezeACCESS 3.5a1:*** frq3_5a1GHzHoppingSequence10MHz (23) frq3_5a1GHzHoppingSequence12MHz (24) frq3_5a1GHzHoppingSequence14MHz (25) frq3_5a1GHzHoppingSequence24MHz (26) frq3_5a1GHzHoppingSequence28MHz (27) frq3_5a1GHzHoppingSequence36MHz (28) frq3_5a1GHzHoppingSequence42MHz (29) frq3_5a1GHzHoppingSequence50MHz (33) frqFlexibleHopping (37) frqSingleChannel3_5a1GHz (39) frq3_5a1GHzHoppingSequence24MhzProprietary(70)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*HoppingBands (continued)		***BreezeACCESS 3.5b, 3.5ab:*** frq3_5aGHzHoppingSequence10MHz (15) frq3_5aGHzHoppingSequence12MHz (16) frq3_5aGHzHoppingSequence14MHz (17) frq3_5aGHzHoppingSequence24MHz (18) frq3_5aGHzHoppingSequence28MHz (19) frq3_5aGHzHoppingSequence36MHz (20) frq3_5aGHzHoppingSequence42MHz (21) frq3_5bGHzHoppingSequence50MHz (32) frqFlexibleHopping (37) frqSingleChannel3_5GHz (40) frq3_5aGHzHoppingSequence24MhzProprietary(69) ***BreezeACCESS 3.8:*** frq3_8GHzBand1 (0) frq3_8GHzSelectable (1) frq3_8GHzApprovalSpectrumMask (2) frqFlexibleHopping (37) frqSingleChannel3_8GHz (42) ***BreezeACCESS 5.2: (read only)*** frqFlexibleHopping (37) ***BreezeACCESS 5.7*** frg5_7GHzISMUsFCC(74) frg5_7GHzInternational(75) frg5_7GHzFlexibleHopping(37)
*MaxDataRate 710.3.3. 6.10 (*AirInterface 10)	Applicable to SU and AU. The maximum transmission data rate.	Integer max1Mbps (1) max2Mbps (2) max3Mbps (3) na (255)
*TransmitPowerControl 710.3.3. 6.11 (*AirInterface 11)	Applicable to IF based units only. Not applicable to AlvariBase, AU-BS-WA Enables reducing the transmit power level. The maximum available value is for maximum power. A lower value reduces the transmitted power. The resulting transmit power level depends on the unit type (band) and on the attenuation of the IF cable. In SU, If ATPC is enabled the algorithm uses it as the initial power level.	Integer BreezeACCESS II, XL and MMDS: 0-15 BreezeACCESS V: 0-7 na (255)
*RxAttenuationControl 710.3.3. 6.12 (*AirInterface 12)	Applicable to IF-based SU (SU-A/E) only. Enables to set the attenuation in the receive path to 0, 10 or 25dB. The effect of inserting such attenuation in the receive circuit is equivalent to reducing the level of the received signal (including both signal and noise) by 2dB when selecting 10dB attenuation and 12dB when selecting 25dB attenuation.	Integer low0dB (0) med10dB (1) high25dB (2) na (255)
*MaximumVoiceSessions 710.3.3. 6.14 (*AirInterface 14)	Applicable to AU only. The maximum number of simultaneous voice sessions permitted to guarantee minimum quality.	Integer 0-50 na (255)
*FlexSubBandDef 710.3.3. 6.15 (*AirInterface 15)	Applicable to SU and AU only. Flexible Hopping Definition parameters.	

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*AddSubBand 710.3.3. 6.15.1 (*FlexSubBandDef 1)	Applicable to SU and AU only. In BreezeACCESS II, V and MMDS families it adds sub-bands (f1-f2) or discrete frequencies to the list of sub-bands/frequencies to be used for generating the basic Hopping Sequence after the next reset. In BreezeACCESS XL it defines a new set of sub-bands/frequencies to be used for generating the basic Hopping Sequence after the next reset.	DisplayString (SIZE(244)) Up to 244 printable ASCII characters. Use either MHZ resolution ìaaaaî or kHz resolution ìaaaa.bbbî. Use a hyphen between two entries defining a sub-band. Use a comma between sub-bands and/or discrete frequency entries. Do not use spaces.
*DelSubBand 710.3.3. 6.15.2 (*FlexSubBandDef 2)	Applicable to SU and AU in BreezeACCESS II, V and MMDS families only. Deletes sub-bands (f1-f2) or discrete frequencies from the list of sub-bands/frequencies to be used for generating the basic Hopping Sequence after the next reset.	DisplayString (SIZE(244)) Up to 244 printable ASCII characters. Use either MHZ resolution ìaaaaî or kHz resolution ìaaaa.bbbî. Use a hyphen between two entries defining a sub-band. Use a comma between sub-bands and/or discrete frequency entries. Do not use spaces.
*ErazeAllSubBands 710.3.3. 6.15.3 (*FlexSubBandDef 3)	Applicable to SU and AU in BreezeACCESS II, V and MMDS families only. Deletes all entries from the table of the frequencies to be used.	Integer eraseAll (0) noOperation (1) na (255)
*SubBandTable 710.3.3. 6.15.4 (*FlexSubBandDef 4)	Applicable to SU and AU only. The list of sub-bands to be supported after next reset. Not accessible.	
*SubBandEntry 710.3.3. 6.15.4.1 (*SubBandTable 1)	Applicable to SU and AU only. A Sub-Band Table entry. Not accessible.	
*SubBand 710.3.3. 6.15.4.1.1 (*SubBandEntry 1)	Applicable only to SW version 2.6. Applicable to SU and AU only. Read-only. A Sub-Band in the Sub-Bands Table.	Integer
*SubBandsTableIdx 710.3.3. 6.15.4.1.2 (*SubBandEntry 2)	Applicable to SU and AU only. Read-only. A Sub-Band Table entry index.	Integer
*SubBandExp 710.3.3. 6.15.4.1.3 (*SubBandEntry 3)	Applicable to SU and AU only. Read-only. A Sub-Band in the Sub-Bands Table.	DisplayString (SIZE(10))
*CurrentHoppingSeqTable 710.3.3. 6.15.5 (*FlexSubBandDef 5)	Applicable to SU and AU only. The list of hopping frequencies in the Current Hopping Sequence. Not accessible.	
*CurrentHoppingSeqEntry 710.3.3. 6.15.5.1 (*CurrentHoppingSeqTable 1)	Applicable to SU and AU only. A Current Hopping Sequence Table entry. Not accessible.	
*HopSeqSubBand 710.3.3. 6.15.5.1.1 (*CurrentHoppingSeqEntry 1)	Applicable only to SW version 2.6. Applicable to SU and AU only. Read-only. A frequency in the Current Hopping Sequence Table.	Integer
*CurrHopSeqTableIdx 710.3.3. 6.15.5.1.2 (*CurrentHoppingSeqEntry 2)	Applicable to SU and AU only. Read-only. A Current Hopping Sequence Table index.	Integer
*CurrSubBandExp 710.3.3. 6.15.5.1.3 *CurrentHoppingSeqEntry 3)	Applicable to SU and AU only. Read-only. A frequency in the Current Hopping Sequence Table.	DisplayString (SIZE(10))

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*ChannelSpacing 710.3.3. 6.15.5 (*FlexSubBandDef 5)	Applicable to SU and AU in BreezeACCESS XL family only. Applicable only in Flexible Hopping Definition mode. Defines the minimum distances between two frequencies. (Not available in some products that only support a 2MHz Channel Spacing)	Integer space1_75MHz (0) space1MHz (1) space2MHz (2) na (255)
*AddFlexHopChannels 710.3.3. 6.15.7 (*FlexSubBandDef 7)	Applicable to SU and AU in BreezeACCESS MMDS family only. Adds MMDS channels to the list of channels to be used.	DisplayString (SIZE(244)) Up to 244 printable ASCII characters in one of the following formats: 1. A1 2. B2,C3,G4 (no spaces)
*DelFlexHopChannels 710.3.3. 6.15.8 (*FlexSubBandDef 8)	Applicable to SU and AU in BreezeACCESS MMDS family only. Deletes MMDS channels from the list of channels to be used.	DisplayString (SIZE(244)) Up to 244 printable ASCII characters in one of the following formats: 1. A1 2. B2,C3,G4 (no spaces)
*ScramblingDefinition 710.3.3. 6.15.9 (*FlexSubBandDef 9)	Applicable to SU and AU. Scrambling parameters.	
*ScramblingMode 710.3.3. 6.15.9.1 (*ScramblingDefinition 1)	Applicable to SU and AU. The method of scrambling the frequencies defined in the Flexible Hopping Definition process for generating the basic hopping sequence. Standard mode - this mode automatically scrambles the frequencies according to the algorithm used in SW version 3.x and lower. It is suitable for up to 6 frequencies. Enhanced mode - this mode automatically scrambles the frequencies according to a new algorithm. Manual mode - The user defines the hopping sequence using the frequencies indexes.	Integer standardMode (1) manualMode (2) enhancedMode(3)
*ManualSequenceDefinition 710.3.3. 6.15.9.2 (*ScramblingDefinition 2)	Applicable to SU and AU. Manual scrambling definition. Configuring the sequence using the frequencies indexes.	Display String. Up to 244 printable ASCII characters. Allowed Range of Indexes: '1' to 'Number of Channels'. Sequence Length must be equal to 'Number of Channels'. Use a comma to separate between entries.
*EraseManualSequence 710.3.3. 6.15.9.3 (*ScramblingDefinition 3)	Applicable to SU and AU. Erase the manually configured sequence.	Integer cancelOperation (0) eraseAll (1)
*SpanningFactor 710.3.3. 6.15.9.4 (*ScramblingDefinition 4)	Applicable to AU only. The Spanning Factor to be used by the Enhanced Scrambling mechanism. The Spanning Factor should be chosen so that the GCD (Greater Common Divisor) of the Spanning Factor and the Number of Frequencies would be 1 (e.g. for 8 frequencies possible values for the Spanning Factor are 1, 3, 5 and 7). The SU learns the value of the Spanning Factor from the AU.	Integer From 1 to 'Number of Frequencies', provided it meets the GCD requirement.
*ScrambledSeqTable 710.3.3. 6.15.9.5 (*ScramblingDefinition 5)	Applicable to SU and AU only. The scrambled sequence to be supported after next reset. Not accessible.	
*ScrambledSeqEntry 710.3.3. 6.15. 9.5.1 (*ScrambledSeqTable 1)	Applicable to SU and AU only. A Scrambled Sequence Table entry. Not accessible.	

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*ScrambledSeqTableIdx 710.3.3. 6.15. 9.5.1.1 (**ScrambledSeqEntry 1)	Applicable to SU and AU only. Read-only. A Scrambled Sequence Table entry index.	Integer
*ScrambledSeqFreqIdx 710.3.3. 6.15. 9.5.1.2 (**ScrambledSeqEntry 2)	Applicable to SU and AU only. Read-only. A Frequency Index in the Scrambled Sequence Table.	DisplayString (SIZE(10))
*CallAgingTime 710.3.3. 6.16 (*AirInterface 16)	Applicable to AU only. The aging time for a voice call in the Call Info database.	Integer 1-50,000 (seconds) 1=No aging
*SecurityParameters 710.3.3. 6.17 (*AirInterface 17)	Security Parameters	
*PrivacyOptionImplemented 710.3.3. 6.17.1 (*SecurityParameters 1)	Applicable to SU and AU. Read Only. Enable/disable the privacy option. Normally set to active.	Integer notActive (0) active (1)
*AuthenticationAlgorithm 710.3.3. 6.17.2 (*SecurityParameters 2)	Applicable to SU and AU only. Enables/disables the authentication option. openSystem: authentication messages are not encrypted. sharedKey: Authentication messages are encrypted. supportAll: Applicable for AU only. Allows authentication of all SUs, regardless of the Authentication Algorithm and WEP Key used in the SU.	Integer openSystem (0) sharedKey (1) supportAll (2) (AU only)
*DefaultKeyID 710.3.3. 6.17.3 (*SecurityParameters 3)	Applicable to SU only. The ID of the key to be used for encryption the authentication messages.	Integer 1-4
*WEPKey1 710.3.3. 6.17.4 (*SecurityParameters 4)	Applicable to SU and AU only. Encryption WEP Key#1. Accessible only with SNMP Write Community.	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey2 710.3.3. 6.17.5 (*SecurityParameters 5)	Applicable to SU and AU only. Encryption WEP Key#2. Accessible only with SNMP Write Community.	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey3 710.3.3. 6.17.6 (*SecurityParameters 6)	Applicable to SU and AU only. Encryption WEP Key#3. Accessible only with SNMP Write Community.	DisplayString (SIZE(10)) Ten hexadecimal digits
*WEPKey4 710.3.3. 6.17.7 (*SecurityParameters 7)	Applicable to SU and AU only. Encryption WEP Key#4. Accessible only with SNMP Write Community.	DisplayString (SIZE(10)) Ten hexadecimal digits.
*CurrentTxPwrLvl 710.3.3. 6.18 (*AirInterface 18)	Applicable only to SU-R units and to SU-I and AU-I units with HW version C or lower. Enables setting the transmitted power level according to the unit capabilities. In SU-R-3.5ab, If ATPC is enabled the algorithm uses it as the initial power level.	Integer Low (0) high (1)medium (2) — applicable only to SU-R-3.5ab
*WirelessTrapThreshold 710.3.3. 6.19 (*AirInterface 19)	A wireless link quality threshold for sending the *WirelessStatusTRAP,or *WirelessStatusOfSUsTRAP. These traps indicate whether the quality has gone below or above the specified threshold.	Integer SU: 0-255 (RSSI units) AU: 0-100 (% retransmissions)
*NumberOfHoppingFrequenciess 710.3.3. 6.20 (*AirInterface 20)	Applicable to SU and AU. Read-only. The Number of Hopping Frequencies used in the AU.	Integer 0-151 na (255)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*OperatorESSID 710.3.3. 6.21 (*AirInterface 21)	Applicable to AU only. A secondary ESSID to support upgrade of existing installations. All AUs in the region should be configured to the same Operator ESSID to allow a new SU to associate with any AU. Accessible only with SNMP Write Community	DisplayString (SIZE(31)) Up to 31 printable ASCII characters, case sensitive.
*RunTimeESSID 710.3.3. 6.22 (*AirInterface 22)	Applicable to SU only. Read-only. The ESSID of the associated AU. Accessible only with SNMP Write Community.Can be viewed (get) with the SNMP Read Community only if *SNMPReadESSID is enabled.	DisplayString (SIZE(31)) Up to 31 printable ASCII characters, case sensitive.
*BestAu 710.3.3. 6.23 (*AirInterface 23)	Best AU Parameters	
*BestAuSupport 710.3.3. 6.23.1 (*BestAu 1)	Applicable to SU only. Disable/ enable the Best AU selection mechanism.	Integer disable (0) enable (1) na (255)
*BestAuNoOfScanningAttempts 710.3.3. 6.23.2 (*BestAu 2)	Applicable to SU only. The number of scanning attempts to collect information for the Best AU decision.	Integer 1 – 255
*NeighborAuTable 710.3.3. 6.23.3 (*BestAu 3)	Applicable to SU only. A table of data on neighboring AUs. Not accessible.	
*NeighborAuEntry 710.3.3. 6.23.3.1 (*NeighborAuTable 1)	Applicable to SU only. An entry in the Neighbor AU Table. Not accessible.	
*NeighborAuMacAdd 710.3.3. 6.23.3.1.1 (*NeighborAuEntry 1)	Applicable to SU only. Read-only. A MAC address of an AU in the Neighbor AU Table.	MAC address
*NeighborAuESSID 710.3.3. 6.23.3.1.2 (*NeighborAuEntry 2)	Applicable to SU only. Read-only. The ESSID of an AU in the Neighbor AU Table. Accessible only with SNMP Write Community	DisplayString (SIZE(31)) Up to 31 printable ASCII characters, case sensitive.
*NeighborAuRssi 710.3.3. 6.23.3.1.3 (*NeighborAuEntry 3)	Applicable to SU only. Read-only. The received signal strength in RSSI units of an AU in the Neighbor AU Table.	Integer
*NeighborAuAssocLoadStatus 710.3.3. 6.23.3.1.4 (*NeighborAuEntry 4)	Applicable to SU only. Read-only. Neighbor AU association load status in the Neighbor AU Table.	Integer notFull (0) full (1) na (255)
*NeighborAuMark 710.3.3. 6.23.3.1.5 (*NeighborAuEntry 5)	Applicable to SU only. Read-only. Neighbor AU mark in the Neighbor AU Table.	Integer
*NeighborAuIdx 710.3.3. 6.23.3.1.6 (*NeighborAuEntry 6)	Applicable to SU only. Read-only. An index of an entry in the Neighbor AU Table.	Integer
*NeighborAuDbm 710.3.3. 6.23.3.1.7 (*NeighborAuEntry 7)	Applicable to SU only. Read-only. The received signal strength in dBm of an AU in the Neighbor AU Table.	Integer
*PreferredAuMacAddress 710.3.3. 6.23.5 (*BestAu 5)	Applicable to SU only. The MAC address of the preferred AU (overriding the Best AU selection process. 00...00 (all zeros in address) means no preferred AU is set.	MAC Address

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*TransmitLevel 710.3.3. 6.24 (*AirInterface 24)	Applicable only to SU-I and AU-I units with HW version D and higher. Sets the level in dBm of the transmitted power at the antenna port.	Integer 0-21dBm na (255)
* brzaccAtpc 710.3.3. 6.25 (*AirInterface 25)	ATPC Parameters	
*AtpcOption 710.3.3. 6.25.1 (*Atpc 1)	Applicable to IF based units and SU-R-3.5ab units only. Enabling/ disabling the ATPC Algorithm.	Integer disable (0) enable (1) na (255)
*AtpcMaximumRSSI 710.3.3. 6.25.2 (*Atpc 2)	Applicable to IF based AU only. Defines the maximum desired level of the average RSSI at the AU. Above this level, if *AtpcOption is enabled, the AU will transmit ATPC Power-Down messages to the applicable SU. The *AtpcMaximumRSSI cannot be lower than *AtpcMinimumRSSI.	Display String -100 to 0 [dBm]
AtpcMinimumRSSI 710.3.3. 6.25.3 (*Atpc 3)	Applicable to IF based AU only. Defines the minimum desired level of the average RSSI at the AU. Below this level, if *AtpcOption is enabled, the AU will transmit ATPC Power-Up messages to the applicable SU. The *AtpcMinimumRSSI cannot be higher than *AtpcMaximumRSSI.	Display String -100 to 0 [dBm]
AtpcMinimumIntervalBetweenMessages 710.3.3. 6.25.4 (*Atpc 4)	Applicable to IF based AU only. The minimum interval between two consecutive AU to SU ATPC Power-Up/Power-Down messages.	Integer 0 to 3600 (seconds) na (255)
RssiMemoryFactor 710.3.3. 6.25.5 (*Atpc 5)	Applicable to IF based AU only. The weight of history in average RSSI calculation. The higher is the value, the higher is the weight of history	Display String -1 (disregard history) to 32
AtpcLevelSteps 710.3.3. 6.25.6 (*Atpc 6)	Applicable to IF based AU only. The step size in percentages of maximum number of available levels that the SU will use when receiving an ATPC Power-Up/Power-Down message.	Integer 1-100(%) na (255)
AtpcMaxLastLevelTimeAfterReset 710.3.3. 6.25.7 (*Atpc 7)	Applicable to IF based SU and SU-R-3.5ab units only. The maximum time (in seconds) of scanning attempts after reset, using the last value of *CurrentTransmitPowerControl, before returning to the configured value of *TransmitPowerControl (IF-based SU) or *CurrentTxPwrLvl (SU-R-3.5ab).	Integer 0 to 3600 [Seconds]
AtpcMaxLastLevelTimeAfterSyncLoss 710.3.3. 6.25.8 (*Atpc 8)	Applicable to IF based SU and SU-R-3.5ab units only. The maximum time (in seconds) of scanning attempts after synchronization loss, using the last value of *CurrentTransmitPowerControl, before returning to the configured value of *TransmitPowerControl (IF-based SU) or brzaccCurrentTxPwrLvl (SU-R-3.5ab).	Integer 0 to 3600 [Seconds]
*ACSEParameters 710.3.3. 6.27 (*AirInterface 27)	Applicable for AU, SU and GU. ACSE Voice Scheduler parameters.	

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*ACSEOption 710.3.3. 6.27.1 (*ACSEParameters 1)	Applicable for AU, SU and GU. Read-only in the SU. Disable/enable the ACSE Voice Scheduler mechanism.	Integer disable (0) enable (1)
*ACSEDwellTime 710.3.3. 6.27.2 (*ACSEParameters 2)	Applicable for AU, SU and GU. Read-only. The dwell time when the *ACSEOption is enabled. Currently set to 60 milliseconds.	Integer 60 (mseconds) na (255)
*ACSEMaximumVoiceSessions 710.3.3. 6.27.3 (*ACSEParameters 3)	Applicable to AU only. The maximum number of simultaneous ACSE voice sessions permitted to guarantee minimum quality. Applicable only when the *ACSEOption is enabled.	Integer 0-15 na (255)
*ACSENumberOfDataRetransmissions 710.3.3. 6.27.4 (*ACSEParameters 4)	Applicable to SU and AU. Maximum times to retransmit an unacknowledged data packet. Applicable only when the *ACSEOption is enabled.	Integer 0-100
*ACSENumberOfVoiceRetransmissions 710.3.3. 6.27.5 (*ACSEParameters 5)	Applicable to SU with voice and AU. Maximum times to retransmit an unacknowledged voice packet. Applicable only when the *ACSEOption is enabled.	Integer 0-100
*OperatorESSIDOption 710.3.3. 6.28 (*AirInterface 28)	Applicable for AU only. The Enabling/disabling the use of the Operator ESSID.	Integer disable (0) enable (1) na (255)
*MaxNumOfAssociations 710.3.3. 6.29 (*AirInterface 29)	Sets the upper limit for the number of Subscriber Units that can be associated with the AU.	Integer 0-512
*CurrentTransmitPowerControl 710.3.3. 6.30 (*AirInterface 30)	Applicable for both AU and SU IF based SU units (SU-A/E) and SU-R-3.5ab units. Displays the current value that is used to control the transmit power level of the unit. If brzaccAtpcOption is disabled, it equals the value of brzaccTransmitPowerControl (SU-A/E units) or brzaccCurrentTxPwrLvl (SU-R-3.5ab units). If brzaccAtpcOption is enabled, its' value may change depending on the ATPC algorithm.	Integer SU-A/E in BreezeACCESS II, XL and MMDS: 0-15, SU-A/E in BreezeACCESS V: 0-7 SU-R-3.5ab:0-2
* SiteProprietary 710.3.3. 6.31 (*AirInterface 31)	Site Proprietary parameters. Applicable only to BreezeACCESS II SU and AU configured to work in the special Site Proprietary hopping standard.	
SPNumOfFreqs 710.3.3. 6.31.1 (SiteProprietary 1)	Number of frequencies in the proprietary hopping sets parameters.	
*FirstSetNumOfFreqs 710.3.3. 6.31.1.1 (*SPNumOfFreqs 1)	Read-Only. Number of frequencies in the first set.	Integer na (255)
*SecondSetNumOfFreqs 710.3.3. 6.31.1.2 (*SPNumOfFreqs 2)	Read-Only. Number of frequencies in the second set.	Integer na (255)
*ThirdSetNumOfFreqs 710.3.3. 6.31.1.3 (*SPNumOfFreqs 3)	Read-Only. Number of frequencies in the third set.	Integer na (255)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
SPFreqs 710.3.3. 6.31.2 (SiteProprietary 2)	Site Proprietary frequencies parameters.	
*SPFreqsTable 710.3.3. 6.31.2.1 (*SPFreqs 1)	A table of frequencies in the Site Proprietary hopping sets. Not accessible.	
sPFreqsEntry 710.3.3. 6.31.2.1.1 (*SPFreqsTable 1)	An entry in the table of frequencies in the Site Proprietary hopping sets. Not accessible.	
sPFreqIdx 710.3.3. 6.31.2.1.1.1 (sPFreqsEntry 1)	A index of an entry in the able of frequencies in the Site Proprietary hopping sets. Read Only.	Integer
sPFirstSetFreq 710.3.3. 6.31.2.1.1.2 (sPFreqsEntry 2)	A frequency in the first Site Proptietary hopping set. Read Only.	Integer
sPSecondSetFreq 710.3.3. 6.31.2.1.1.3 (sPFreqsEntry 3)	A frequency in the second Site Proptietary hopping set. Read Only.	Integer
sPThirdSetFreq 710.3.3. 6.31.2.1.1.3 (sPFreqsEntry 3)	A frequency in the third Site Proptietary hopping set. Read Only.	Integer
*AlvariBaseParams 710.3.3. 6.34 (*AirInterface 34)	AlvariBase Parameters. Applicable only to BA-AU-WA.	
*RFUGain 710.3.3. 6.34.1 (*AlvariBaseParams 1)	RFU Gain parameters	
*RFUTxGain 710.3.3. 6.34.1.1 (*RFUGain 1)	RFU Tx Gain	Integer 0-99 (dBm) na (255)
*RFURxGain 710.3.3. 6.34.1.2 (*RFUGain 1)	RFU Rx Gain	Integer 0-99 (dBm) na (255)
*IFMUXLoss 710.3.3. 6.34.2 (*AlvariBaseParams 2)	IF MUX Loss parameters	
*IFMUXTxLoss 710.3.3. 6.34.2.1 (*IFMUXLoss 1)	IF MUX Tx Loss	Integer 0-99 (dBm) na (255)
*IFMUXRxLoss 710.3.3. 6.34.2.2 (*IFMUXLoss 2)	IF MUX Rx Loss	Integer 0-99 (dBm) na (255)
*ExternalAttenuator 710.3.3. 6.34.3 (*AlvariBaseParams 3)	External Attenuation	Integer 0-50 (dBm) (Typical:0 or 10) na (255)
*IFCableLoss 710.3.3. 6.34.4 (*AlvariBaseParamParams 4)	IF Cable Loss parameters	
*IFCableTxLoss 710.3.3. 6.34.4.1 (*IFCableLoss 1)	IF Cable Tx loss	Integer 0-99 (dBm) na (255)
*IFCableRxLoss 710.3.3. 6.34.4.2 (*IFCableLoss 2)	IF Cable Rx loss	Integer 0-99 (dBm) na (255)
*RequiredTxPower 710.3.3. 6.34.5 (*AlvariBaseParams 5)	Required Tx Power	Integer 0-35 (dBm) na (255

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*ScanningMode 710.3.3.6.35 (*AirInterface 35)	Applicable to SU only. Not applicable if *ACSEOption is enabled. Sets the scanning mode.	passive (1) active (2) na (255)
*SendRoamingSNAP 710.3.3.6.37 (*AirInterface 37)	Applicable to all SUs, except to SU-BD and SU-BD1V. Disables/enables the Send Roaming SNAP feature.	Integer disable (0) enable (1) na (255)
*AUTransmissionRateContro l710.3.3.6.38 (*AirInterface 38)	Applicable to SU only. When enabled, the maximum rate of transmissions from the AU to this SU is determined by the value of the Maximum Data Rate in the SU.	Integerdisable (0) enable (1) na (255)
*MacAddressBlackList 710.3.3.6.39 (*AirInterface 36)	Applicable to AU only. Not Accessible. MAC Address Black List parameters	
* MacAddressBlackListTable 710.3.3.6.39.1 (*MacAddressBlackList 1)	Applicable to AU only. Not Accessible. A list of up to 100 MAC Addresses of SUs that will not be served by the AU.	
*MacAddressBlackListTableEntry 710.3.3.6.39.1.1 (*MacAddressBlackListTable 1)	Applicable to AU only. Not Accessible. An entry in the Mac Address Black List Table.	
*MacAddressBlackListTableIdx 710.3.3.6.39.1.1.1 (*MacAAddressBlackListTableEntry 1)	Applicable to AU only. A read only table index for a MAC Address entry in the Mac Address Black List Table.	Integer 1-100
*MacAddressBlackListId 710.3.3.6.39.1.1.2 (*MacAddressBlackListTableEntry 2)	Applicable to AU only. The list of MAC Addresses in the Mac Address Black List Table. To Remove a MAC Address - SET the corresponding entry to 0. To Add a new MAC Address - SET an entry which is currently 0.	MacAddress

Performance Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*PerformanceParams 710.3.3. 7 (brzAccessMib 7)		
*NumOfRetransmissions 710.3.3. 7.1 (*PerformanceParams 1)	Applicable to SU and AU. Maximum times to retransmit an unacknowledged packet. Applicable only when the *ACSEOption is disabled.	Integer 0-100
*NumOfDwellToRetransmit 710.3.3. 7.2 (*PerformanceParams 2)	Applicable to SU and AU. Minimum dwell periods during which an unacknowledged packet is retransmitted.	Integer 0-9
*NumOfRetransToDecRate 710.3.3. 7.3 (*PerformanceParams 3)	Applicable to SU and AU. Number of unsuccessful retransmissions to decrease the transmission rate.	Integer 0-10
*MinContentionWin 710.3.3. 7.5 (*PerformanceParams 5)	Applicable to SU and AU. Determines the size of the contention window, which is the time to wait before transmission for collision avoidance.	Integer 7-255.
*MaxMulticastRate 710.3.3. 7.6 (*PerformanceParams 6)	Applicable to SU and AU. Maximum rate for transmission of multicast and broadcast messages.	Integer max1Mbps (1) max2Mbps (2) max3Mbps (3) na (255)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*CarrierSenseLevel 710.3.3. 7.7 (*PerformanceParams 7)	Applicable to SU and AU. Threshold level for decision on existence of a carrier signal, indicating a transmission from another unit.	DisplayString -100 to -40 (dB)
*DwellTime 710.3.3. 7.9 (*PerformanceParams 9)	Applicable to AU and GU. The time spent on each radio channel (hop). Applicable only when the *ACSEOption is disabled.	Integer t32KiloMicroseconds(32) t64KiloMicroseconds(64) t128KiloMicroseconds(128) na (255)
*RTSThreshold 710.3.3. 7.10 (*PerformanceParams 10)	Applicable to SU and AU. The minimum frame size that requires an RTS/CTS handshake.	Integer 20-1600 (bytes)
*MultiRate 710.3.3. 7.11 (*PerformanceParams 11)	Applicable to SU and AU. Multi-Rate parameters	
*MultiRateSupport 710.3.3. 7.11.1 (*MultiRate 1)	Applicable to SU and AU. Enables/ disables the multi-Rate decision mechanism.	Integer disable (0) enable (1) na (255)
*MultiRateDecisionWinSize 710.3.3. 7.11.2 (*MultiRate 2)	Applicable to SU and AU. The size of the decision window for the multi-Rate mechanism (the number of consecutive transmission or retransmission attempts).	Integer 1-50 na (255)
*NoOfFailuresInDecisionWindow 710.3.3. 7.11.3 (*MultiRate 3)	Applicable to SU and AU. The number of failures in the decision window that will cause the window to be defined as unsuccessful.	Integer 1 to Decision Window Size. na (255)
*GpsHoppingParams 710.3.3. 7.12 (*PerformanceParams 12)	GPS Hopping Parameters	
*NumberOfHoppingFreqs 710.3.3. 7.12.1 (*GpsHoppingParams 1)	Applicable to GU Only. The Number of Hopping Frequencies used in the AUs controlled by the GU.	Integer 0-151 na (255)
*GpsAntennaRecovery 710.3.3. 7.12.3 (*GpsHoppingParams 3)	Applicable to GU only. Antenna Recovery parameters.	
*ManualRecoveryMode 710.3.3. 7.12.3.1 (*GpsAntennaRecovery 1)	Applicable to GU only. Enables to initiate an antenna recovery process. Applicable only to master GU.	cancel (0) activateRecoveryProcedureNow (1) na (255)
*AutomaticRecoveryMode 710.3.3. 7.12.3.2 (*GpsAntennaRecovery 2)	Applicable to GU only. Automatic Antenna Recovery parameters.	
*AutomaticRecoveryOption 710.3.3. 7.12.3.2.1 (*AutomaticRecoveryMode 1)	Applicable to GU only. Enables or disables the automatic GPS antenna recovery mode. Applicable only for a master GU.	disable (0) enable (1) na (255)
*AutomaticRecoveryInterval 710.3.3. 7.12.3.2.2 (*AutomaticRecoveryMode 2)	Applicable to GU only. Defines the time interval in minutes between two consecutive activations of the automatic recovery process.	Integer 5-1440 (minutes)
*NoiseFloor 710.3.3. 7.13 (*PerformanceParams13)	Applicable to SU and AU. Noise Floor Level.	Display String -115 to -50[dBm]
*CarrierToInterferenceDifference 710.3.3. 7.15 (*PerformanceParams 15	Applicable to SU and AU. The minimal difference between the current estimated noise level and a signal identified as a valid carrier.	Integer 6-60 (dB)

Site Survey Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*SiteSurvey 710.3.3. 8 (brzAccessMib 8)		
PerHopStatisticsTable 710.3.3. 8.1 (*SiteSurvey 1)	Applicable to SU and AU. Statistics accumulated since last reset and average RSSI per frequency for all hopping frequencies in the (sequence). Not Accessible.	
hopSeqEntry 710.3.3. 8.1.1 (perHopStatisticsTable 1)	Applicable to SU and AU. A Per Hop Statistics Table entry. Not accessible.	
wPperHopStatisticsTable 710.3.3. 8.1.1.1 (hopSeqEntry 1)	Applicable to SU and AU. Read-only. The channel number according to the hopping sequence.	Integer
hopTracerRx 710.3.3. 8.1.1.2 (hopSeqEntry 2)	Applicable to SU and AU. Read-only. The accumulated number of frames received since last reset at the applicable frequency.	Integer
hopTracerTx 710.3.3. 8.1.1.3 (hopSeqEntry 3)	Applicable to SU and AU. Read-only. The accumulated number of frames transmitted since last reset at the applicable frequency.	Integer
hopTracerRetries 710.3.3. 8.1.1.4 (hopSeqEntry 4)	Applicable to SU and AU. Read-only. The accumulated number of frames retransmitted since last reset at the applicable frequency.	Integer
hopTracerRSSI 710.3.3. 8.1.1.5 (hopSeqEntry 5)	Applicable to SU and AU. Read-only. The average RSSI of frames received at the applicable frequency.	DisplayString (SIZE(20))
* hopTracerFreq 710.3.3. 8.1.1.6 (hopSeqEntry 6)	Applicable to SU and AU. Read-only. The frequency in MHz of the entry.	DisplayString (SIZE(9))
*TrafficStatistics 710.3.3. 8.2 (*SiteSurvey 2)	Applicable to SU and AU. Traffic Statistics parameters.	
*ResetTrafficCounters 710.3.3. 8.2.1 (*TrafficStatistics 1)	Applicable to SU and AU. Resets the Ethernet Counters (*EthCounters) and the Wireless Link Counters (*WlanCounters).	Integer noReset (0) reset (1)
*EthCounters 710.3.3. 8.2.2 (*TrafficStatistics 2)	Applicable to SU and AU. Ethernet counters.	
*TotalRxFramesViaEthernet 710.3.3. 8.2.2.1 (*EthCounters 1)	Applicable to SU and AU. Read-only. Total number of frames received via the Ethernet port.	Counter
*TxWirelessToEthernet 710.3.3. 8.2.2.2 (*EthCounters 2)	Applicable to SU and AU. Read-only. Total number of frames transmitted to the Ethernet port.	Counter
*WlanCounters 710.3.3. 8.2.3 (*TrafficStatistics 3)	Applicable to SU and AU. Wireless link counters.	
*TotalTxFramesToWireless 710.3.3. 8.2.3.1 (*WlanCounters 1)	Applicable to SU and AU. Read-only. The number of frames transmitted to the wireless media. The count includes one count for each data or RTP frame that was transmitted successfully (excluding retransmissions), and also the number of transmitted control and management frames.	Counter

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*TotalRxFramesFromWireless 710.3.3. 8.2.3.2 (*WlanCounters 2)	Applicable to SU and AU. Read-only. The total number of frames that were received from the wireless media. The count includes data and control and management frames, including beacons received from the AU. The count does not include frames that were discarded internally, bad frames and duplicate frames.	Counter
*TotalRetransmittedFragments 710.3.3. 8.2.3.3 (*WlanCounters 3)	For future use	Counter
*WlanFramesDropped 710.3.3. 8.2.3.4 (*WlanCounters 4)	Applicable to SU and AU. Read-only. The number of dropped frames. The frames that were retransmitted to the extent of the maximum allowed number of retransmissions without being acknowledged.	Counter
*TransmittedFramesToWirelessDat a 710.3.3. 8.2.3.5 (*WlanCounters 5)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The number of data frames transmitted to the wireless media. The count includes one count for each data frame that was transmitted successfully (excluding retransmissions).	Counter
*TransmittedFramesToWirelessVoi ce 710.3.3. 8.2.3.6 (*WlanCounters 6)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The number of voice frames, including fax and redundant T.38 frames, transmitted to the wireless media. The count includes one count for each frame that was transmitted successfully (excluding retransmissions).	Counter
*TransmittedFramesToWirelessBea con 710.3.3. 8.2.3.7 (*WlanCounters 7)	Applicable to AU only when the ACSE Option is enabled. Read-only. The number of beacons transmitted to the wireless media. The count includes one count for each beacon that was transmitted successfully (excluding retransmission attempts).	Counter
*TotalSubmittedFrames 710.3.3. 8.2.3.8 (*WlanCounters 8)	Applicable to SU and AU. Read-only. The total number of data and RTP frames submitted to the bridge for transmission to the wireless media. The count does not include control and management frames, and retransmissions.	Counter
*SubmittedFramesHigh 710.3.3. 8.2.3.9 (*WlanCounters 9)	Applicable to SU and AU. Read-only. Counts the number of frames submitted to the bridge via the High queue for transmission to the wireless media. When the ACSE Option is enabled, it counts data and RTP frames. When the ACSE Option is disabled, it counts only data frames.	Counter
*SubmittedFramesMid 710.3.3. 8.2.3.10 (*WlanCounters 10)	Applicable to SU and AU. Read-only. Counts the number of frames submitted to the bridge via the Mid queue for transmission to the wireless media. When the ACSE Option is enabled, it counts data and RTP frames. When the ACSE Option is disabled, it counts only data frames.	Counter

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*SubmittedFramesLow 710.3.3. 8.2.3.11 (*WlanCounters 11)	Applicable to SU and AU. Read-only. Counts the number of frames submitted to the bridge via the Low queue for transmission to the wireless media. When the ACSE Option is enabled, it counts data and RTP frames. When the ACSE Option is disabled, it counts only data frames.	Counter
*SubmittedFramesVoice 710.3.3. 8.2.3.12 (*WlanCounters 12)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. Counts the number of voice frames, including fax and T.38 redundant frames, submitted to the bridge for transmission to the wireless media.	Counter
*FramesDroppedData 710.3.3. 8.2.3.13 (*WlanCounters 13)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The number of dropped data frames. The data frames that were retransmitted to the extent of the maximum allowed number of retransmissions for data frames without being acknowledged.	Counter
*FramesDroppedVoice 710.3.3. 8.2.3.14 (*WlanCounters 14)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The number of dropped voice frames, including fax and T.38 redundant frames. The voice frames that were retransmitted to the extent of the maximum allowed number of retransmissions for voice frames without being acknowledged.	Counter
*TotalRetransmittedFrames 710.3.3. 8.2.3.15 (*WlanCounters 15)	Applicable to SU and AU. Read-only. The total number of retransmissions of frames (counts all unsuccessful transmissions/ retransmissions).	Counter
*RetransmittedFramesData 710.3.3. 8.2.3.16 (*WlanCounters 16)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The total number of retransmissions of data frames (counts all unsuccessful transmissions/retransmissions).	Counter
*RetransmittedFramesVoice 710.3.3. 8.2.3.17 (*WlanCounters 17)	Applicable to SU and AU only when the ACSE Option is enabled. Read-only. The total number of retransmissions of voice frames, including fax and T.38 redundant frames (counts all unsuccessful transmissions/retransmissions).	Counter
*TotalTxErrors 710.3.3. 8.2.3.19 (*WlanCounters 19)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred.	Counter
*TotalTxErrors 710.3.3. 8.2.3.20Hw (*WlanCounters 20)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred due to an hardware problem.	Counter
*TotalTxErrorsAbr 710.3.3. 8.2.3.21 (*WlanCounters 21)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because transmission has been aborted before completion due to internal problems in the DSP.	Counter
*TotalTxErrorsCsl 710.3.3. 8.2.3.22 (*WlanCounters 22)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because transmission was cancelled due to the modem being busy receiving data.	Counter

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*TotalTxErrorsAckTOut 710.3.3. 8.2.3.23 (*WlanCounters 23)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because of an Acknowledge Timeout–a frame that was not acknowledged within the time defined by the Acknowledge Delay Limit parameter.	Counter
*TotalTxErrorsFail 710.3.3. 8.2.3.24 (*WlanCounters 24)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because of an internal timeout in the modem.	Counter
*TotalTxErrorsAckCrc 710.3.3. 8.2.3.25 (*WlanCounters 25)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because of a CRC error in the ACK message.	Counter
*TotalTxErrorsRtsc 710.3.3. 8.2.3.26 (*WlanCounters 26)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because RTS was sent but CTS was not received (RTS collision).	Counter
*TotalTxErrorsEod 710.3.3. 8.2.3.27 (*WlanCounters 27)	Applicable to SU and AU. Read-only. The number of transmit errors that have occurred because there was not enough time left to transmit the message prior to the end of the Dwell.	Counter
*TotalReceivedDataFrames 710.3.3. 8.2.3.28 (*WlanCounters 28)	Applicable to SU and AU. Read-only. The total number of data frames received from the wireless media, including duplicate frames.	Counter
*ReceivedDataFramesHigh 710.3.3. 8.2.3.29 (*WlanCounters 29)	Applicable to SU and AU. Read-only. The total number of data frames received from the wireless media and routed via the receive High queue, including duplicate frames.	Counter
*ReceivedDataFramesLow 710.3.3. 8.2.3.30 (*WlanCounters 30)	Applicable to SU and AU. Read-only. The total number of data frames received from the wireless media and routed via the receive Low queue, including duplicate frames.	Counter
*BadFragmentsReceived 710.3.3. 8.2.3.31 (*WlanCounters 31)	Applicable to SU and AU. Read-only. The number of frames received from the wireless media with errors (CRC errors).	Counter
*DuplicatedFramesDiscarded 710.3.3. 8.2.3.32 (*WlanCounters 32)	Applicable to SU and AU. Read-only. The number of frames discarded due to receiving multiple copies.	Counter
*InternallyDiscardedMirCir 710.3.3. 8.2.3.33 (*WlanCounters 33)	Applicable to SU and AU. Read-only. The number of data frames received from the Ethernet port that were discarded by the MIR/CIR mechanism to avoid exceeding the maximum allowed information rate.	Counter
*TotalTxUnicastFramesToWireless 710.3.3. 8.2.3.34 (*WlanCounters 34)	Applicable to SU and AU. Read-only. The number of unicast frames successfully transmitted to the wireless media, excluding retransmissions.	Counter
*VoiceCounters 710.3.3. 8.2.4 (*TrafficStatistics 4)	Applicable to SU with voice support only.	

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*VoiceTrafficTxFrames 710.3.3. 8.2.4.1 (*VoiceCounters 1)	Applicable to SU with voice support only. Read-only. Counts the number of voice frames, including fax and T.38 redundant frames, that were transmitted to the wireless link.	Counter
*VoiceTrafficRxFrames 710.3.3. 8.2.4.2 (*VoiceCounters 2)	Applicable to SU with voice support only. Read-only. Counts the number of voice frames, including fax and T.38 redundant frames, that were received from the wireless link.	Counter
*VoiceTrafficTxBytes 710.3.3. 8.2.4.3 (*VoiceCounters 3)	Applicable to SU with voice support only. Read-only. Counts the number of voice bytes, including fax and T.38 redundant bytes, that were transmitted to the wireless link.	Counter
*VoiceTrafficRxBytes 710.3.3. 8.2.4.4 (*VoiceCounters 4)	Applicable to SU with voice support only. Read-only. Counts the number of voice bytes, including fax and T.38 redundant bytes, that were received from the wireless link	Counter
*VoiceTrafficResetCounters 710.3.3. 8.2.4.5 (*VoiceCounters 5)	Applicable to SU with voice support only. Reset the voice counters.	noReset (0) reset (1) na (255)
*PerRateCounters 710.3.3. 8.2.5 (*TrafficStatistics 5)	Applicable to SU and AU.	
*ResetPerRateCounters 710.3.3. 8.2.5.1 (*PerRateCounters 1)	Applicable to AU and SU. Resets the Per Rate Counters.	noReset (0) reset (1) na (255)
*PerRateCountersSU 710.3.3. 8.2.5.2 (*PerRateCounters 2)	SU Per Rate Counters.	
*TxFrames1M 710.3.3. 8.2.5.2.1 (*PerRateCountersSU 1)	Applicable to SU only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted over the wireless link at 1Mbps.	Counter
*TxFrames2M 710.3.3. 8.2.5.2.2 (*PerRateCountersSU 2)	Applicable to SU only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted over the wireless link at 2Mbps.	Counter
*TxFrames3M 710.3.3. 8.2.5.2.3 (*PerRateCountersSU 3)	Applicable to SU only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted over the wireless link at 3Mbps.	Counter
*ReTxFrames1M 710.3.3. 8.2.5.2.4 (*PerRateCountersSU 4)	Applicable to SU only. Read-only. Counts the total number of frames that were retransmitted over the wireless link at 1Mbps.	Counter
*ReTxFrames2M 710.3.3. 8.2.5.2.5 (*PerRateCountersSU 5)	Applicable to SU only. Read-only. Counts the total number of frames that were retransmitted over the wireless link at 2Mbps.	Counter
*ReTxFrames3M 710.3.3. 8.2.5.2.6 (*PerRateCountersSU 6)	Applicable to SU only. Read-only. Counts the total number of frames that were retransmitted over the wireless link at 3Mbps.	Counter
*ReceivingUnits 710.3.3. 8.3 (*SiteSurvey 3)		
*AveragePower 710.3.3. 8.3.1 (*ReceivingUnits 1)	Applicable to SU only. Read-only. Represents the average Signal Strength of received frames.	DisplayString (SIZE(32))
*RssiOrDbm 710.3.3. 8.3.2 (*ReceivingUnits 2)	Applicable to SU and AU. Selects the measurement units used to display the average received signal strength.	Integer rssi (0) dBm (1)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*PerHopStatistics 710.3.3. 8.4 (*SiteSurvey 4)	Applicable to SU and AU.	
*ResetPerHopStatistics 710.3.3. 8.4.1 (*PerHopStatistics 1)	Applicable to SU and AU. Reset the Per Hop Statistics counters.	Integer noReset (0) reset (1)
*MacAddressDatabase_ 710.3.3. 8.5 (*SiteSurvey 5)	Applicable to AU only. Database by MAC Addresses for all SUs associated with the AU. The databse include parameters learned by the AU from the SUs and some counters of wireless traffic between the AU and the relevant SU, as measured by the AU.	
*AdbResetAllCounters 710.3.3. 8.5.1 (*MacAddressDatabase 1)	Applicable to AU only. To reset all the counters for all SUs in the MAC Address Database. This includes the following counters: *AdbTxFramesTotal *AdbTxFrames1M *AdbTxFrames2M *AdbTxFrames3M *AdbRTxFramesTotal *AdbRTxFrames1M *AdbRTxFrames2M *AdbRTxFrames3M *AdbTxDroppedFrames *AdbRxFramesTotal	noReset (0) reset (1)
*AdbTable 710.3.3. 8.5.2 (*MacAddressDatabase 2)	Applicable to AU Only. Not accessible. MAC Address Database table.	
*AdbEntry 710.3.3. 8.5.2.1 (*AdbTable 1)	Applicable to AU Only. Not accessible. An entry in the MAC Address Database table.	
*AdbIndex 710.3.3. 8.5.2.1.1 (*AdbEntry 1)	Applicable to AU Only. Read only. The index of an entry in the MAC Address Database table.	Integer
*AdbMacAddress 710.3.3. 8.5.2.1.2 (*AdbEntry 2)	Applicable to AU Only. Read only. The MAC Address of an SU entry in the MAC Address Database table.	MAC Address
*AdbMaxRate 710.3.3. 8.5.2.1.3 (*AdbEntry 3)	Applicable to AU Only. Read only. The value configured in the relevant SU for the Maximum Data Rate parameter.	Integer 1, 2 or 3 (Mbps)
*AdbCurrentTxRate 710.3.3. 8.5.2.1.4 (*AdbEntry 4)	Applicable to AU Only. Read only. The current transmit rate to the SU.	Integer 1, 2 or 3 (Mbps)
*AdbTxFramesTotal 710.3.3. 8.5.2.1.5 (*AdbEntry 5)	Applicable to AU Only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted to the SU over the wireless link.	Counter
*AdbTxFrames1M 710.3.3. 8.5.2.1.6 (*AdbEntry 6)	Applicable to AU Only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted to the SU over the wireless link at 1Mbps.	Counter
*AdbTxFrames2M 710.3.3. 8.5.2.1.7 (*AdbEntry 7)	Applicable to AU Only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted to the SU over the wireless link at 2Mbps.	Counter
*AdbTxFrames3M 710.3.3. 8.5.2.1.8 (*AdbEntry 8)	Applicable to AU Only. Read-only. Counts the total number of frames (excluding retransmissions) that were transmitted to the SU over the wireless link at 3Mbps.	Counter
*AdbRTxTotal 710.3.3. 8.5.2.1.9 (*AdbEntry 9)	Applicable to AU Only. Read-only. Counts the total number of frames that were retransmitted to the SU over the wireless link.	Counter

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*AdbRTx1M 710.3.3. 8.5.2.1.10 (*AdbEntry 10)	Applicable to AU Only. Read-only. Counts the total number of frames that were retransmitted to the SU over the wireless link at 1Mbps.	Counter
*AdbRTx2M 710.3.3. 8.5.2.1.11 (*AdbEntry 11)	Applicable to AU Only. Read-only. Counts the total number of frames that were retransmitted to the SU over the wireless link at 2Mbps.	Counter
*AdbRTx3M 710.3.3. 8.5.2.1.12 (*AdbEntry 12)	Applicable to AU Only. Read-only. Counts the total number of frames that were retransmitted to the SU over the wireless link at 3Mbps.	Counter
*AdbTxDroppedFrames 710.3.3. 8.5.2.1.13 (*AdbEntry 13)	Applicable to AU Only. Read-only. Counts the total number of frames intended to the SU that were dropped because they were retransmitted to the extent of the maximum allowed number of retransmissions without being acknowledged.	Counter
*AdbRxFramesTotal 710.3.3. 8.5.2.1.14 (*AdbEntry 14)	Applicable to AU Only. Read-only. Counts the total number of frames that were received from the SU over the wireless link.	Counter
*AdbCirTx 710.3.3. 8.5.2.1.16 (*AdbEntry 16)	Applicable to AU Only. Read only. The value configured in the relevant SU for the CIR: SU to AU parameter.	Integer 0-2200 (Kbps)
*AdbMirTx 710.3.3. 8.5.2.1.17 (*AdbEntry 17)	Applicable to AU Only. Read only. The value configured in the relevant SU for the MIR: SU to AU parameter.	Integer 32-2200 (Kbps)
*AdbCirRx 710.3.3. 8.5.2.1.18 (*AdbEntry 18)	Applicable to AU Only. Read only. The value configured in the relevant SU for the CIR: AU to SU parameter.	Integer 0-2200 (Kbps)
*AdbMirRx 710.3.3. 8.5.2.1.194 (*AdbEntry 19)	Applicable to AU Only. Read only. The value configured in the relevant SU for the MIR: AU to SU parameter.	Integer 32-2200 (Kbps)
*AdbCirMaxDelay 710.3.3. 8.5.2.1.20 (*AdbEntry 20)	Applicable to AU Only. Read only. The value configured in the applicable SU for *MaxDelay parameter.	Integer
*AdbStatus 710.3.3. 8.5.2.1.21 (*AdbEntry 21)	Applicable to AU Only. Read only. The status of the relevant SU.	Integer associated (1) authenticated (2) notAuthenticated 3)
*AdbSwVersion 710.3.3. 8.5.2.1.22 (*AdbEntry 22)	Applicable to AU Only. Read only. The SW version of the relevant SU.	DisplayString
*AdbRssi 710.3.3. 8.5.2.1.23 (*AdbEntry 23)	Applicable to AU Only. Read only. The average received signal level based on frames received by the AU from the relevant SU, in RSSI units.	Integer
*AdbDbm 710.3.3. 8.5.2.1.244 (*AdbEntry 24)	Applicable to AU Only. Read only. The average received signal level based on frames received by the AU from the relevant SU, in dBm units.	DisplayString
*AtpcCounters 710.3.3. 8.6. (*SiteSurvey 6)	ATPC Messages Counters. Applicable to IF based AU and to all SU units.	
*ResetAtpcCounters 710.3.3. 8.6.1 (*AtpcCounters 1)	Resets the ATPC Counters.	Integer noReset (0) reset (1)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
AtpcTransmittedMessages 710.3.3. 8.6.2 (*AtpcCounters 2)	Applicable to IF based AU. The total number of ATPC messages transmitted by the unit since last reset.	Integer
AtpcReceivedMessages 710.3.3. 8.6.3 (*AtpcCounters 3)	Applicable to SU units only. The number of ATPC messages received by the unit since last reset regardless of whether the unit supports ATPC.	Integer
*AUAlarms 710.3.3. 8.7 (*SiteSurvey 7)	Applicable to IF-based AU only. AU Alarms parameters.	
*AUAlarmsOption 710.3.3. 8.7.1 (*AUAlarms 1)	Applicable to IF-based AU only. Disable/enable the AU Alarms test mechanism.	Integer disable (0) enable (1)
*AUAlarmsLearningPeriod 710.3.3. 8.7.2 (*AUAlarms 2)	Applicable to IF-based AU only. The time period after reset or after enabling the AU Alarms Option that is dedicated to accumulating information only. During this period the AU does not activate alarms, except to the No Associations alarm.	Integer 1 – 1440 (minutes)
*AUAlarmsTestCycle 710.3.3. 8.7.3 (*AUAlarms 3)	Applicable to IF-based AU only. The tine interval between two consecutive polling message transmissions. This is also the time interval used for calculating the current averages for the various traffic statistics.	Integer 1 – 1440 (minutes)
*AUAlarmsTrafficStatistics 710.3.3. 8.7.4 (*AUAlarms 4)	Applicable to IF-based AU only. Traffic Statistics parameters.	
*TrafficStatisticsTable 710.3.3. 8.7.4.1 (*AUAlarmsTrafficStatistics 1)	Applicable to IF-based AU only. Not accessible. AU Alarms Traffic Statistic Table containing traffic statistics parameters and test results.	
*TrafficStatisticsEntry 710.3.3. 8.7.4.1.1 (*TrafficStatisticsTable 1)	Applicable to IF-based AU only. Not accessible. An entry in the AU Alarms Traffic Statistic Table.	
*TrafficStatisticsType 710.3.3. 8.7.4.1.1.1 (*TrafficStatisticsEntry 1)	Applicable to IF-based AU only. Read-only. The traffic statistics' type of an entry in the AU Alarms Traffic Statistics Table. Serves also as the index of the entry.	Integer retransmissionsRate (1) droppedFramesRate (2) crcErrorRate (3) duplicateFramesRate (4)
*TrafficStatisticsCurrentRate 710.3.3. 8.7.4.1.1.2 (*TrafficStatisticsEntry 2)	Applicable to IF-based AU only. Read-only. The current rate calculated for the relevant statistics type.	Integer 0 – 100 (%) na (255)
*TrafficStatisticsAverageRate 710.3.3. 8.7.4.1.1.3 (*TrafficStatisticsEntry 3)	Applicable to IF-based AU only. Read-only. The average rate calculated since the last time the unit was reset (or since the AU Alarms Option was enabled) for the relevant statistics type.	Integer 0 – 100 (%) na (255)
*MinorAlarmMinimumDelta 710.3.3. 8.7.4.1.1.4 (*TrafficStatisticsEntry 4)	Applicable to IF-based AU only. Read-write. The minimum difference between the Traffic Statistics Current Rate and the Traffic Statistics Average Rate for activating a minor severity alarm for the relevant statistics type. Another prerequisite for activating the alarm is that the Traffic Statistics Current Rate exceeds the Traffic Statistics Minor Alarm Threshold.	Integer 0 – 100 (%)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*MinorAlarmThreshold 710.3.3. 8.7.4.1.1.5 (*TrafficStatisticsEntry 5)	Applicable to IF-based AU only. Read-write. The threshold for activating a minor severity alarm for the relevant statistics type. Another prerequisite for activating the alarm is that the difference between the Traffic Statistics Current Rate and the previous Traffic Statistics Average Rate exceeds the Traffic Statistics Minor Alarm Minimum Delta.	Integer 1 – 100 (%)
*MajorAlarmThreshold 710.3.3. 8.7.4.1.1.6 (*TrafficStatisticsEntry 6)	Applicable to IF-based AU only. Read-write. The threshold for activating a major severity alarm for the relevant statistics type.	Integer 1 – 100 (%)
*AURxPowerTest 710.3.3. 8.7.5 (*AUAlarms 5)	Applicable to IF-based AU only. AU Alarms AU Rx Power Tests parameters and measurement results.	
*AURxPowerAverageDelta 710.3.3. 8.7.5.1 (*AURxPowerTest 1)	Applicable to IF-based AU only. Read-only. The average for all SUs that responded to the last two polling messages of the difference between the last RSSI at the AU and the previous (one before last) RSSI. (A negative value indicates that the average RSSI was decreased).	DisplayString -99 to 99 (dBm)
*AURxPowerDecreaseThreshold 710.3.3. 8.7.5.2 (*AURxPowerTest 2)	Applicable to IF-based AU only. Read-write. The Minimum decrease in the value of the AU Rx Power Average Delta that will trigger an alarm. (If the AU Rx Power Decrease Threshold is +X, an alarm will be generated if the AU Rx Power Average Delta is smaller than or equal to –X)	Integer 1 – 99 (dBm)
*SURxPowerTest 710.3.3. 8.7.6 (*AUAlarms 6	Applicable to IF-based AU only. AU Alarms SU Rx Power Tests parameters and measurement results.	
*SURxPowerAverageDelta 710.3.3. 8.7.6.1 (*SURxPowerTest 1)	Applicable to IF-based AU only. Read-only. The average for all SUs that responded to the last two polling messages of the difference between the last RSSI at the SU and the previous (one before last) RSSI. (A negative value indicates that the average RSSI was decreased).	DisplayString -99 to 99 (dBm)
*SURxPowerDecreaseThreshold 710.3.3. 8.7.6.2 (*SURxPowerTest 2)	Applicable to IF-based AU only. Read-write. The Minimum decrease in the value of the SU Rx Power Average Delta that will trigger an alarm. (If the SU Rx Power Decrease Threshold is +X, an alarm will be generated if the SU Rx Power Average Delta is smaller than or equal to –X)	Integer 1 – 99 (dBm)
*RespondingSUs 710.3.3. 8.7.7 (*AUAlarms 7)	Applicable to IF-based AU only. Responding SUs parameters.	
*CurrentNumberOfRespondingSUs 710.3.3. 8.7.7.1 (*RespondingSUs 1)	Applicable to IF-based AU only. Read-only. The number of SUs that responded to the last polling message.	Integer na (255)
*AverageNumberOfRespondingSUs 710.3.3. 8.7.7.2 (*RespondingSUs 2)	Applicable to IF-based AU only. Read-only. The average number of SUs that responded to polling message since power-up or since the AU Alarms Option was enabled.	Integer na (255)

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*MinimumAverageNumberOfSUs 710.3.3. 8.7.7.3 (*RespondingSUs 3)	Applicable to IF-based AU only. The minimum average number of SUs required for association tests	Integer 1 – 254 (SUs)
*AUAlarmsStatus 710.3.3. 8.7.8 (*AUAlarms 8)	Applicable to IF-based AU only. Alarms Status parameters.	
*AlarmsStatusTable 710.3.3. 8.7.8.1 (*AUAlarmsStatus 1)	Applicable to IF-based AU only. Not accessible. AU Alarms Status Table containing the current status of each of the alarms.	
*AlarmsStatusEntry 710.3.3. 8.7.8.1.1 (*AlarmsStatusTable 1)	Applicable to IF-based AU only. Not accessible. An entry in the AU Alarms Status Table.	
*AlarmType 710.3.3. 8.7.8.1.1.1 (*AlarmsStatusEntry 1)	Applicable to IF-based AU only. Read only. The alarm type of an entry in the AU Alarms Status Table. Serves also as the index of the entry.	Integer noAssociations (1) allAssociationsLost (2) txPowerLevelDecrease (3) rxSignalStrengthDecrease (4) highRetransmissionsRate (5) highDroppedFramesRate (6) highCRCErrorRate (7) highDuplicateFramesRate (8)
*AlarmStatus 710.3.3. 8.7.8.1.1.2 (*AlarmsStatusEntry 2)	Applicable to IF-based AU only. Read only. The status of the alarm of an entry in the AU Alarms Status Table. Serves also as the index of the entry.	Integer off (0) minor (1) major (2) critical (3)
*ClearAllAlarms 710.3.3. 8.7.8.2 (*AUAlarmsStatus 2)	Applicable to IF-based AU only. Read-write. Perform set with value 'clearAllalarms' in order to clear all the alarms of the AU Alarms feature. Setting any value other than 'clearAllalarms' has no effect	Integer cancelRequest (0) clearAllAlarms (1)

Special Operations Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*SpecialOp 710.3.3. 9 (brzAccessMib 9)		
*RadioBand 710.3.3. 9.1 (*SpecialOp 3)	Applicable to AU and SU. Read-only. Identifies the product family/band:	DisplayString (SIZE(15)) (2.4 (BreezeACCESS II), MMDS, 2.6a, 2.6b, 3.3a, 3.5a, 3.5a1, 3.5b, 3.5ab, 3.5e, 3.6b, 3.8, 5.2, 5.7(SD), 3.5Aw, 3.5Bw, 3.5Cw)

Note: *Additional Special Operations parameters are reserved for factory use only.*

Unit Control Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*UnitControl 710.3.3. 10 (brzAccessMib 10)		
*ResetUnit 710.3.3. 10.1 (*UnitControl 1)	Applicable to all products. Resets the unit and applies new parameter values.	Integer cancel (0) resetSystemNow (1)
*SetDefaults 710.3.3. 10.2 (*UnitControl 2)	Applicable to all products. Sets unit configuration to Defaults values after the next reset. completeFactory: All parameters revert to Factory Defaults values partialFactory: All parameters revert to Factory Defaults values, except the parameters required for maintaining wireless connectivity. completeOperator: All parameters revert to Operator Defaults values partialOperator: All parameters revert to Operator Defaults values, except the parameters required for maintaining wireless connectivity.	Integer cancel (0) completeFactory (1) partialFactory (2) completeOperator (1) partialOperator (2)
*UnitName 710.3.3. 10.3 (*UnitControl 3)	Applicable to all products. The unit name.	DisplayString (SIZE(32)) A string of up to 32 printable ASCII characters.
*FlashMemoryControl 710.3.3. 10.4 (*UnitControl 4)	Applicable to all products. Reset And Boot From Shadow Version: Activates the backup version. Use Current Version After Reset : The currently active version is activated after reset.	Integer Cancel (0) resetAndBootFrom ShadowVersion (1) useCurrentVersion AfterReset (2)
*ConsoleSpeed 710.3.3. 10.5 (*UnitControl 5)	Applicable to all products. The communication speed of the Monitor port.	Integer s9600bps (1) s19200bps (2) s38400bps (3) s57600bps (4) s115200bps (5)
*MonitorLogoutTimer 710.3.3. 10.6 (*UnitControl 6)	Applicable to all products. Time-out of management programs (Monitor, Telnet). Automatic exit if the program is inactive for the defined time.	Integer 1-999 (minutes)
*UnitPasswords 710.3.3. 10.7 (*UnitControl 7)		
*ReadOnlyPassword 710.3.3. 10.7.1 (*UnitPasswords 1)	Applicable to all products. The User (read only) password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*InstallerPassword 710.3.3. 10.7.2 (*UnitPasswords 2)	Applicable to all products. The Installer password.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*AdminPassword 710.3.3. 10.7.3 (*UnitPasswords 3)	Applicable to all products. The Administrator password. This is also the SNMP Write Community String.	DisplayString (SIZE(8)). Up to 8 printable ASCII characters.
*EventLog 710.3.3. 10.10 (*UnitControl 10)	Applicable to all products. Event Log parameters	
*EventLogPolicy 710.3.3. 10.10.1 (*EventLog 1)	Applicable to all products. Determines which events will be stored in the Event Log. Event from the configured level and higher are stored and can be displayed using the Monitor or by getting a the log file using TFTP.	Integer logAll (1) message (2) warning (3) error (4) fatal (5) logNone (6)
*NumberOfEventsInLogFile 710.3.3. 10.10.2 (*EventLog 2)	Applicable to all products. Read-only. The number of events in the Event Log file.	Integer

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*EraseEventLog 710.3.3. 10.10.3 (*EventLog 3)	Applicable to all products. Deletes all entries from the Event Log file.	Integer cancel (0) erase (1)
*SaveCurrentConfigurationAs OperatorDefaults 710.3.3. 10.12 (*UnitControl 12)	Applicable to all products. Saves the current configuration as Operator Defaults.	Integer cancel (0) saveAsDefaults (1)
*ExitMonitorOrTelnet 710.3.3. 10.13 (*UnitControl 13)	Applicable to all products. Exit the monitor program.	Integer cancelOperation (0) exit (1)
*AutoConfig 710.3.3. 10.14 (*UnitControl 14)	Auto configuration Parameters	
*AutoConfigOption 710.3.3. 10.14.1 (*AutoConfig 1)	Disable/enable the Auto Configuration feature	Integer disable (0) enable (1) na (255)
*RequestAutoConfig 710.3.3. 10.14.2 (*AutoConfig 2)	Initiate a request for an Auto Configuration file.	Integer cancelRequest (0) request (1)
*AutoConfigReceived 710.3.3. 10.14.3 (*AutoConfig 3)	Indicates whether an Auto Configuration file was received.	Integer notReceived (0) received (1)
*SNMPReadESSID 710.3.3. 10.15 (*UnitControl 15)	Applicable to AU and SU. Enables or disables viewing (get) the values of ESSID and RunTimeESSID with the SNMP Read Community string.	Integer disable (1) enable (2)

IP Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*IpParams 710.3.3. 11 (brzAccessMib 11)		
*UnitIpAddress 710.3.3. 11.1 (*IpParams 1)	Applicable to all products. IP address of the unit.	IP address
*SubNetMask 710.3.3. 11.2 (*IpParams 2)	Applicable to all products. Subnet mask of the unit.	IP address
*DefaultGWAddress 710.3.3. 11.3 (*IpParams 3)	Applicable to all products. Default gateway IP address of the unit.	IP address
*UseDhcp 710.3.3. 11.4 (*IpParams 4)	Applicable to all products. DHCP client mode of operation. disabled: Use regular (manual) methods to configure IP parameters. dHCP Only: Use DHCP server to configure IP parameters. automatic: Use DHCP server to configure IP parameters. If a DHCP server is not available, use configured values for *UnitIpAddress, *SubNetMask and *DefaultGWAddress.	Integer disable (0) dHCPOnly (1) automatic (2)
*RunIPaddr 710.3.3. 11.5 (*IpParams 5)	Applicable to all products. Read-only: The run-time IP address. If DHCP is used the Run Time IP Address is the address given to the unit by the server. Otherwise it is the manualy configured address.	IP address
*RunSubNetMask 710.3.3. 11.6 (*IpParams 6)	Applicable to all products. Read-only: The run-time Subnet Mask. If DHCP is used the Run Time Subnet Mask is the mask given to the unit by the server. Otherwise it is the manualy configured mask.	IP address
*RunDefaultIPGateway 710.3.3. 11.7 (*IpParams 7)	Applicable to all products. Read-only: The run-time Gateway IP address. If DHCP is used the Run Time Gateway IP Address is the address given to the unit by the server. Otherwise it is the manualy configured address.	IP address
*AccessToDHCP 710.3.3. 11.8 (*IpParams 8)	Applicable to all products. The port to be used for communicating with a DHCP server. (In GU only the fromEthernetOnly option is available).	Integer fromWlanOnly(0) fromEthernetOnly(1) fromBoth(2)

System Information Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*SysInfo 710.3.3. 13 (brzAccessMib 13)		
*UnitHwVersion 710.3.3. 13.1 (*SysInfo 1)	Applicable to all products. Read-only: Hardware platform version.	DisplayString (SIZE(0..32))
*VoiceHwVersion 710.3.3. 13.2 (*SysInfo 2)	Applicable only to SU with voice. Read-only: Voice hardware platform version.	DisplayString (SIZE(0..32))
*SoftwareVersion 710.3.3. 13.3 (*SysInfo 3)	Applicable to all products. Read-only: Running software version.	DisplayString (SIZE(0..32))
*ShadowVersion 710.3.3. 13.4 (*SysInfo 4)	Applicable to all products. Read-only: Shadow software version.	DisplayString (SIZE(0..32))
*SupportedMibVersion 710.3.3. 13.5 (*SysInfo 5)	Applicable to all products. Read-only: The supported private MIB versions.	DisplayString (SIZE(0..32))
*UnitMacAddress 710.3.3. 13.6 (*SysInfo 6)	Applicable to all products. Read-only, Unit hardware MAC address.	MAC address

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*UnitType 710.3.3. 13.7 (*SysInfo 7)	Applicable to all products. Read-only: Unit type.	DisplayString (SIZE(0..32))
*AssociatedAU 710.3.3. 13.8 (*SysInfo 8)	Applicable to SU only. Read-only: Associated AU MAC address.	MAC address
*NumOfAssociationsSinceLastReset 710.3.3. 13.9 (*SysInfo 9)	Applicable to AU and SU. Read-only: The number of associations since last reset, including duplicate associations (re-associations).	Integer
*FlashType 710.3.3. 13.10 (*SysInfo 10)	Applicable to all products. Read-only: Flash memory type. Type S - Strata Flash. Type F – all other Flash types.	DisplayString (SIZE(0..31))
*FlashSize 710.3.3. 13.11 (*SysInfo 11)	Applicable to all products. Read-only: Flash size in Mb.	Integer
*SwVersionAfterReset 710.3.3. 13.12 (*SysInfo 12)	Applicable to all products. Read-only: The software version to be used after next reset.	DisplayString (SIZE(0..32))
*MaxPowerOutput 710.3.3. 13.13 (*SysInfo 13)	Applicable to SU and AU. Read-only: The maximum output power to the antenna port.	Integer na (255)
*FrequencyDuplex 710.3.3. 13.14 (*SysInfo 14)	Applicable to SU and AU in BreezeACCESS XL family only. Read-only: The frequency separation between uplink and downlink.	Integer
*UnitStatus 710.3.3. 13.15 (*SysInfo 15)	Applicable to GU only. The status of the GPS antenna.	DisplayString (SIZE(0..100))
*CurrentNumOfAssociations 710.3.3. 13.16 (*SysInfo 16)	Applicable to AU only. Read-only. The number of subscriber units currently associated with the AU.	Integer
*CurrentNumOfVoiceSessions 710.3.3. 13.17 (*SysInfo 17)	Applicable to AU only. Read-only. The number of voice sessions currently conducted by SUs served by the AU.	Integer
*ChannelSpacingApplicable 710.3.3. 13.18 (*SysInfo 18)	Applicable to AU and SU in BreezeACCESS XL family only. Read-only. The applicability status of brzaccChannelSpacing	Integer no (0) yes (1)
*PowerLevelApplicable 710.3.3. 13.19 (*SysInfo 19)	Applicable to AU-I and SU-I. Read-only. The applicability status of brzaccCurrentTxPwrLvl (for compliance with certain regulations it may be configured in the factory to low without the ability to change it to high).	Integer no (0) yes (1)
*GpsMasterOrSlaveStatus 710.3.3. 13.20 (*SysInfo 20)	Applicable to GU only. Read-only. GPS Master/ Slave status indication.	Integer master (1) slave (2)

Alarms Parameters

MIB Parameter (Location in Parenthesis)	Description	Values/Range
*Alarms 710.3.3. 20 (brzAccessMib 20)	Alarms parameters	
*GpsAlarms 710.3.3. 20.1 (*Alarms 1)	Applicable to GU only. GPS Alarms parameters.	
*AlarmInTable 710.3.3. 20.1.1 (*GpsAlarms 1)	Applicable to GU only. Names and status of Alarms-In. Not accessible.	
*AlarmInTableEntry 710.3.3. 20.1.1.1 (*AlarmInTable 1)	Applicable to GU only. An Alarms In table entry. Not accessible.	
*AlarmInIdx 710.3.3. 20.1.1.1.1 (*AlarmInTableEntry 1)	Applicable to GU only. Read-only. Alarms In table index	Integer 1-10
*AlarmInName 710.3.3. 20.1.1.1.2 (*AlarmInTableEntry 2)	Applicable to GU only. Alarm In name. Alarms 1 to 4 can receive a name. The other are read-only.	DisplayString (SIZE(0..31))
*AlarmInStatus 710.3.3. 20.1.1.1.3 (*AlarmInTableEntry 3)	Applicable to GU only. Read-only. The status (off or on) of Alarm In entry.	Integer off (0) on (1) na (255)
*AlarmOutTable 710.3.3. 20.1.2 (*GpsAlarms 2)	Applicable to GU only. Names, definition, control and status of Alarms-Out. Not accessible.	
*AlarmOutTableEntry 710.3.3. 20.1.2.1 (*AlarmOutTable 1)	Applicable to GU only. An Alarms Out table entry. Not accessible.	
*AlarmOutIdx 710.3.3. 20.1.2.1.1 (*AlarmOutTableEntry 1)	Applicable to GU only. Read-only. Alarms Out table index	Integer 1-3
*AlarmOutName 710.3.3. 20.1.2.1.2 (*AlarmOutTableEntry 2)	Applicable to GU only. Alarm Out name. The other are read-only.	DisplayString (SIZE(0..31))
*AlarmOutDefinition 710.3.3. 20.1.2.1.3 (*AlarmOutTableEntry 3)	Applicable to GU only. Enter an Alarm-In number to activate the Alarm-Out when this Alarm-In is ON. Enter A to activate the Alarm-Out if ANY of the Alarms-In are ON. Enter N for NONE (never activate the Alarm Out).	DisplayString (SIZE(0..2)) 1-10, A, N
*AlarmOutControl 710.3.3. 20.1.2.1.4 (*AlarmOutTableEntry 4)	Applicable to GU only. Alarm out control: off (0) – turn alarm off. on (1) – turn alarm on. auto (2)-activate according to status of relevant alarm-in in accordance with Alarm Out Definition.	Integer off (0) on (1) auto (2) na (255)
*AlarmOutStatus 710.3.3. 20.1.2.1.5 (*AlarmOutTableEntry 5)	Applicable to GU only. Read-only. The status (off or on) of Alarm Out entry.	Integer off (0) on (1) na (255)

brzPhoneMIB (applicable to SU with voice only)

breezecom OBJECT IDENTIFIER =1.3.6.1.4.1.710
{(iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) breezecom(710)}

breezecomPrvRev OBJECT IDENTIFIER = 1.3.6.1.4.1.710.3
{breezecom 3}

brzPhoneMib OBJECT IDENTIFIER = 1.3.6.1.4.1.710.3.4
{breezecomPrvRev 4 }

Note: ** is used instead of the phon prefix*

Dialing Parameters

MIB Parameter (Location in Parenthesis)	Description	Values
*DialingParams 710.3.4.1 (brzPhonMib 1)		
*PulseDialing 710.3.4.1.1 (*DialingParams 1)	Enables/disables automatic pulse dialing detection.	Integer disable (0) enable (1) na (255)
*GateKeeperOption 710.3.4.1.2 (*DialingParams 2)	Enables/disables communicating with the Gatekeeper for call management purposes.	Integer disable (0) enable (1) na (255)
*GkGwIpAddress 710.3.4.1.3 (*DialingParams 3)	IP Address of the Gateway/ Gatekeeper The parameters must be specified if the [*GateKeeperOption] is enabled.	IP address
*MyTelephoneNumber 710.3.4.1.4 (*DialingParams 4)	The telephone number as specified in the Gateway, if [*GateKeeperOption] is disabled. If the [*GateKeeperOption] is enabled the number is transmitted to the Gatekeeper.	DisplayString (SIZE (0..10)) Up to 10 characters. 0 means no number
*H323TerminalID 710.3.4.1.5 (*DialingParams 5)	The H323 Terminal ID (name) to be used for calling the unit if the feature is enabled. Applicable only if the [*GateKeeperOption] is enabled.	DisplayString (SIZE (0..25)) Up to 24 characters. X=NoID
*IpDialingOption 710.3.4.1.8 (*DialingParams 8)	Enables/disables dialing using IP addresses.	Integer disable (0) enable (1) na (255)
*IpDialingIndicator 710.3.4.1.9 (*DialingParams 9)	Specifies the prefix used to identify an IP dialing string.	DisplayString (SIZE (0..15)) Up to three telephone pad digits (0-9, A-D, *, #). X means no IP Dialing Indicator
*AutomaticPrefix 710.3.4.1.10 (*DialingParams 10)	Specifies a default prefix (number of Gateway trunk) to be automatically inserted before the dialed number.	DisplayString (SIZE (0..15)) Up to eight telephone pad digits (0-9, A-D, *, #). X means no Automatic Prefix.
*FastStart 710.3.4.1.13 (*DialingParams 13)	Enables/disables the fast connect protocol.	Integer disable (0) enable (1) na (255)

MIB Parameter (Location in Parenthesis)	Description	Values
*InformTransferCap 710.3.4.1.14 (*DialingParams 14)	Defines the value of the information transfer capability in the SETUP message.	Integer speech (0) unrestricted (1) restricted (2) audio (3) unrestrictedTones (4) video (5) na (255)
*DTMFRelay 710.3.4.1.15 (*DialingParams 15)	Disable/enable DTMF Relay. 0 ñ Disable. DTMF is transferred in-band. 1 ñ Enable. In-band DTMF is filtered. DTMF is relayed via H.245 session.In case of 'Fast Start' H.245 session will be forced upon DTMF detection. 2 - Enable Proprietary. In-band DTMF is filtered. In case of 'Fast Start' DTMF is relayed via Q.931 session. Otherwise DTMF is relayed via H.245 session.	Integer disable (0) enable (1) enableProprietary (2) na (255)
*DialingPrfxOption 710.3.4.1.16 ((*DialingParams 16)	Defines the Dialing Prefix Option for handling prefixes according to the dialing plan supported by the unit. disable (0): Insert Automatic Prefix (if defined). Otherwise forward as dialed. enable (1): Insert Automatic Prefix (if defined) only if first digit differs from *InterRegionalPrfx. Otherwise forward as dialed. enableBlockInter-RegionalPrfx (2): Insert Automatic Prefix (if defined) only if first digit differs from *InterRegionalPrfx. Remove the first digit if it equals *InterRegionalPrfx and the second digit differs from *InterNationalPrfx. Otherwise forward as dialed.	Integer disable (0) enable (1) enableBlockInter-RegionalPrfx (2) na (255)
*InterRegionalPrfx 710.3.4.1.17 (*DialingParams 17)	To define the Inter Regional prefix to be handled according to the dialing plan supported by the unit.	DisplayString (SIZE (0..1)) One phone keypad digit (0-9, A-D, *, #) or X. X means no Inter Regional Prefix is defined
*InterNationalPrfx 710.3.4.1.18 (*DialingParams 18)	To define the International prefix to be handled according to the dialing plan supported by the unit.	DisplayString (SIZE (0..1)) One phone keypad digit (0-9, A-D, *, #) or X. X means no International Prefix is defined.
*RegistrationTTL 710.3.4.1.19 (*DialingParams 19)	To define the registration Time To Live. (timeToLive request in the RRQ message to the Gatekeeper).	Integer 0 ñ 65535
*EndpointType 710.3.4.1.20 (*DialingParams 20)	To define the EndpointType components in H.323 messages for interoperability with other equipment using H.323.	Integer terminal (1) gateway (2) na (255)
*FaxRelay 710.3.4.1.21 (*DialingParams 21)	Disable/enable T.38 fax relay	Integer disable (0) enable (1) na (255)
*FaxRelayRedundancy 710.3.4.1.22 (*DialingParams 22)	Defines redundancy used for transmitting IFP messages	Integer 0-5 na (255)
*BatteryPolarity 710.3.4.1.23 (*DialingParams 23)	To define the battery polarity for supporting an external device, e.g. for coins or tokens charging purpose. This feature is only available in units with voice card from Version D and up.	Integer forward (1) reverse (2) forwardToReverse (3) reverseToForward (4) na (255)

MIB Parameter (Location in Parenthesis)	Description	Values
*AlternateGkOption 710.3.4.1.24 (*DialingParams 24)	Setting the Alternate Gatekeeper feature. EnableManualDiscovery: the Alternate Gatekeeper IP address is specified by the Alternate Gatekeeper IP Address parameter. EnableAutomaticDiscovery: the Alternate Gatekeeper IP address is received from the Primary GK.	Integer disable (0) enableManualDiscovery (1) enableAutomaticDiscovery (2) na (255)
*AlternateGkIPAddress 710.3.4.1.25 (*DialingParams 25)	To set the Alternate Gatekeeper IP address when Alternate Gatekeeper Option is set to enableManualDiscovery.	IP Address
*CallerID 710.3.4.1.26 (*DialingParams 26)	To defines whether the unit will support generation of Caller ID (CID) signaling and if CID is supported, which standard will be used. disable (0): No CID signalling etsiDtAs (1): CID signalling in accordance with ETSI 300-659-1, using Dual Tone Alerting Signal etsiRpAs (2): CID signalling in accordance with ETSI 300-659-1, using Ringing Pulse Alerting Signal etsiRinging (4): CID signalling in accordance with ETSI 300-659-1, transmitting data during the first long silence between two ring patterns. bellcoreMdmf (5): CID signaling in accordance with Bellcore 202, using Multiple Data Message Format (MDMF) which includes a name field in addition to the date, time and number. bellcoreSdmf (6): CID signaling in accordance with Bellcore 202, using Single Data Message Format (SDMF) which includes the date, time and number.	Integer disable (0) etsi3006591DtAs (1) etsi3006591RpAs (2) etsi3006591Ringing (4) bellcore202Mdmf (5) bellcore202Sdmf (6) na (255)
*StopDialingIndicator 710.3.4.1.27 (*DialingParams 28)	To enable/disable the use of the # sign to indicate end of dialing disable: The # sign is interpreted as a part of the dialed sequence. End of dialing is determined by the *StopDialingTimeOut parameter. enable: The # sign is interpreted as indicating end of dialing sequence.	Integer disable (0) enable (1) na (255)
*StopDialingTimeOut 710.3.4.1.28 (*DialingParams 28)	To define the inactivity time following the last dialed digit that will be identified by the unit as an indication to end of dialing.	Integer 3 – 60 (seconds) na (255)
*OverlapSending 710.3.4.1.29 (*DialingParams 29)	Disable/enable overlap sending. When enabled, each dialed digit is transmitted immediately. When disabled, dialed digits are accumulated and transmitted according to the rules set by other dialing parameters. When enabled, it overrides the setting of other dialing parameters as follows: IP Dialing Option, Dialing Prefix Option and Stop Dialing Indicator are disabled even if the applicable parameter is set to Enable. Automatic Prefix is not used and Stop Dialing Timeout has no effect.	Integer disable (0) enable (1) na (255)

Voice Parameters

MIB Parameter (Location in Parenthesis)	Description	Values
*VoiceParams 710.3.4.2 (brzPhonMib 2)		
*VoiceVolume 710.3.4.2.1 (*VoiceParams 1)	Gain of signal to earphone.	Integer 0-20 (-dB) na (255)
*EchoCancellation 710.3.4.2.3 (*VoiceParams 3)	Enables or disables the echo cancellation feature.	Integer disable (0) enable (1) na (255)
*VoiceCodec 710.3.4.2.4 (*VoiceParams 4)	The relative priority of voice codecs.	DisplayString (SIZE (0..120)) A priorities vector of up to 7 different numbers in the range 1-7, where 1=G.723.1 2=G.729 3=G.711 uLaw 64k 4=G.711 Alaw 64k 5=G.729AnnexA 6= G.729wAnnexB 7= G.729AnnexAwAnnexB
*VoiceActivityDetection 710.3.4.2.5 (*VoiceParams 5)	Enables or disables the voice activity detection (VAD) feature when using G7231 codec.	off (0) g7231 (1) na (255)
*CompressionEfficiency 710.3.4.2.6 (*VoiceParams 6)	Compression Efficiency parameters	
*G723FramesPerPacket 710.3.4.2.6.1 (*CompressionEfficiency 1)	Number of G723.1 voice frames in an RTP packet.	Integer 1-8 na (255)
*G729FramesPerPacket 710.3.4.2.6.2 (*CompressionEfficiency 2)	Number of G729A voice frames in an RTP packet.	Integer 1-8 na (255)
*G711uFramesPer Packet 710.3.4.2.6.3 (*CompressionEfficiency 3)	Number of G11 u-Law voice frames in an RTP packet.	Integer 1-16 na (255)
*G711aFramesPerPacket 710.3.4.2.6.4 (*CompressionEfficiency 4)	Number of G11 A-Law voice frames in an RTP packet.	Integer 1-16 na (255)

Telephony Signals

MIB Parameter (Location in Parenthesis)	Description	Values
*TelephonySignals 710.3.4.3 (brzPhonMib 3)		
*TelephonyCountryStandard 710.3.4.3.1 (*TelephonySignals 1)	The country standard for call progress tones, ringer and timeouts.	INTEGER proprietary (1) germany (2) sweden (3) france (4) unitedKingdom (5) belgium (6) usa (7) chile (8) na (255)
*TonesTable 710.3.4.3.2 (*TelephonySignals 2)	A table of parameters of the tones. If the *TelephonyCountryStandard is set to proprietary, the tones parameters may be configured (read/write). For all other country standards, the values are read-only. Not accessible.	
*TonesEntry 710.3.4.3.2.1 (**TonesTable 1)	A table entry in the Tones Table. Not accessible.	
*TonesIdx 710.3.4.3.2.1.1 (*TonesEntry 1)	An index to the Tones Table indicating the tone type. Read-only.	Integer 1-8
*ToneName 710.3.4.3.2.1.2 (*TonesEntry 2)	The name of the tone.	Integer Dial Tone(1) Ring Back Tone (2) Busy Tone (3) Congestion Tone (4) Call In Process Tone (5) Ring Frequency (6) Error Tone (7) High Level Error Tone (8)
*Freq1 710.3.4.3.2.1.3 (*TonesEntry 3)	One of the two frequencies that can be used for generating the tone. Serves as the Ringer Frequency for Tone 6 (Ring Frequency). If set to 0 – this frequency is not used.	Integer 0-3000 (Hz) If Ring Frequency (Tone 6), valid values are 17, 20, 25, 50 (Hz).
*Freq2 710.3.4.3.2.1.4 (*TonesEntry 4)	The second frequency that can be used for generating the tone. Not Applicable for Ring Frequency (Tone 6) If set to 0 – this frequency is not used.	Integer 0-3000 (Hz). na (255)
*Level1 710.3.4.3.2.1.5 (*TonesEntry 5)	The level in dBm of the first frequency (*Freq1). Not Applicable for Ring Frequency (Tone 6)	Display String -31 to 3 (dBm). ñ32 is for mute.
*Level2 710.3.4.3.2.1.6 (*TonesEntry 6)	The level in dBm of the second frequency (*Freq2). Not Applicable for Ring Frequency (Tone 6)	Display String -31 to 3 (dBm). ñ32 is for mute.
*CadenceOn 710.3.4.3.2.1.7 (*TonesEntry 7)	the ringing time (on) in the tones/silence sequence of the tone.	Integer 100–10,000 (milliseconds)
*CadenceOff 710.3.4.3.2.1.8 (*TonesEntry 8)	the silence time (off) in the tones/silence sequence of the tone.	Integer 100–10,000 (milliseconds)
*Duration 710.3.4.3.2.1.9 (*TonesEntry 9)	the maximum duration of transmitting the tone to the earphone. Tone generation will cease upon hang-up (upon off-hook for Tone 6 - Ring Frequency).	Integer 0-10,000 (seconds) (0 means that the tone is not used).
*TimeOuts 710.3.4.3.3 (*TelephonySignals 3)	Time Out parameters. If the *TelephonyCountryStandard is set to proprietary, the Time Out parameters may be configured (read/write). For all other country standards, the values are read-only.	

MIB Parameter (Location in Parenthesis)	Description	Values
*MinimumFlashDetectTimeOut 710.3.4.3.3.1 (*TimeOuts 1)	The minimum on-hook time for identifying it as a Hook Flash.	Integer 0-2,000 (milliseconds)
*MaximumFlashDetectTimeOut 710.3.4.3.3.2 (*TimeOuts 2)	The maximum on-hook time for identifying it as a Hook Flash.	Integer 0-2,000 (milliseconds)
*DisconnectTimeOut 710.3.4.3.3.3 (*TimeOuts 3)	The minimum time for decision on an on-hook (disconnect) condition.	Integer 0-2,000 (milliseconds)
*InterDigitTimeOut 710.3.4.3.3.4 (*TimeOuts 4)	Applicable only for pulse dialing. The minimum time between two consecutive pulses to be considered as separating between two digits.	Integer 0-2,000 (milliseconds)
*CalledPartyReleaseTimeOut 710.3.4.3.3.5 (*TimeOuts 5)	The minimum time for an on-hook signal on the called party side to be considered as call disconnect.	Integer 0-10,000 (milliseconds)

General Info MIB

MIB Parameter (Location in Parenthesis)	Description	Values
*GenInfo 710.3.4.9 (breezecomPrvRev 9)	General Info MIB	
brzHoppingStandardProtected	Applicable to AU and SU in BreezeACCESS II family. Read-only. Indicates if the Hopping Standard (Band) can be changed (if protected or not).	Integer notProtected (1) protected (2)

Supported Traps

Note: ** is used instead of the brzacc prefix*

Trap Associated Parameters

MIB Parameter (Location in Parenthesis)	Description	Values
*Traps 710.3.3.14 (brzAccessMib 14)		
*TrapSUMacAddr 710.3.3.14.1 (*Traps 1)	Applicable to AU only. SU MAC address.	MAC address
*TrapRssiQuality 710.3.3.14.2 (*Traps 2)	Applicable to SU only. RSSI level of the received signal.	Integer
*TrapLastRssiQuality 710.3.3.14.3 (*Traps 3)	Applicable to SU only. RSSI level of the received signal from the last AU with which the SU was associated.	Integer
*TrapText 710.3.3.14.4 (*Traps 4)	Textual string for future use.	DisplayString

MIB Parameter (Location in Parenthesis)	Description	Values
*TrapToggle 710.3.3.14.5 (*Traps 5)	An On/Off toggle status, indicating a change in status from off to on or vice versa.	Integer on (1) off (2)
*LastAUMacAddress 710.3.3.14.6 (*Traps 6)	Applicable to SU only. The MAC address of the last AU with which the SU was associated.	MAC address
*TrapLog 710.3.3.14.7 (*Traps 7)	Login or logout to the monitor program via the Monitor port or Telnet.	Integer monitorLogin (1) monitorLogout(2) telnetLogin (3) telnetLogout (4)
*TrapParameterChanged 710.3.3.14.8 (*Traps 8)	A modification to one of the parameters related to CIR/ MIR, IP Filtering, Accounting (Billing) or VLAN .	Integer cirOrMir (1) ipFilter (2) billing (3) vlan (4)
*TrapAccessRights 710.3.3.14.9 (*Traps 9)	The access rights used for login.	Integer notLoggedIn (0) readOnly (1) installer (2) administrator (3) factory (4)
*TrapTelnetUserIpAddress 710.3.3.14.11 (*Traps 11)	The IP address of a Telnet user.	IP address
*TrapAlarmNumber 710.3.3.14.12 (*Traps 12)	Applicable to GU only. The number of the alarm whose status has been changed.	Integer 1-10
*TrapAlarmName 710.3.3.14.13 (*Traps 13)	Applicable to GU only. The Name of the alarm whose status has been changed.	DisplayString
*TrapRTx 710.3.3.14.14 (*Traps 14)	Applicable to AU only. Retransmissions as a percentage of total transmissions.	Integer 0-100
*AUAlarmsTraps 710.3.3.14.15 (*Traps 15)	Applicable to IF-based AU only. Not accessible. AU Alarms traps variables.	
*TrapAUAlarmSeverity 710.3.3.14.15.1 (*AUAlarmsTraps 1)	Applicable to IF-based AU only. Read-only. The severity of the alarm.	Integer minor (1) major (2) critical (3)
*TrapCurrentNumberOfRespond-ingSUs 710.3.3.14.15.2 (*AUAlarmsTraps 2)	Applicable to IF-based AU only. Read-only. The number of SUs that responded to the last polling message.	Integer
*TrapAverageNumberOfRespond-ingSUs 710.3.3.14.15.3 (*AUAlarmsTraps 3)	Applicable to IF-based AU only. Read-only. The average number of SUs that responded polling message since power-up or since the AU Alarms Option was enabled.	Integer
*TrapSURxPowerAverageDelta 710.3.3.14.15.4 (*AUAlarmsTraps 4)	Applicable to IF-based AU only. Read-only. The average for all SUs that responded to both of the last two polling messages of the difference between the last RSSI at the SU and the previous (one before last) RSSI. (A negative value indicates that the average RSSI was decreased).	DisplayString -99 to 99 (dBm)
*TrapAURxPowerAverageDelta 710.3.3.14.15.5 (*AUAlarmsTraps 5)	Applicable to IF-based AU only. Read-only. The average for all SUs that responded to both of the last two polling messages of the difference between the last RSSI at the AU and the previous (one before last) RSSI. (A negative value indicates that the average RSSI was decreased).	DisplayString -99 to 99 (dBm)
*TrapTrafficStatisticsCurrentRate 710.3.3.14.15.6 (*AUAlarmsTraps 6)	Applicable to IF-based AU only. Read-only. The current rate calculated for the relevant statistics type.	Integer 0-100 (%) na (255)
*TrapTrafficStatisticsAverageRate 710.3.3.14.15.7 (*AUAlarmsTraps 7)	Applicable to IF-based AU only. Read-only. The average rate calculated since the last time the unit was reset (or since the AU Alarms Option was enabled) for the relevant statistics type.	Integer 0-100 (%) na (255)

Traps

Trap (Number)	Description	Variables
*SUassociatedAUTRAP(2)	An AU trap indicating a new association with an SU.	*TrapSUMacAddr
*AUdisassociatedTRAP(3)	An AU trap indicating that an SU has been disassociated from the AU. The AU decides that an SU has been disassociated from it and remove it from the ADB after receiving from another AU a SNAP frame with the SU MAC address. The SNAP frame indicating a network topology change where the SU has associated with another AU will be received if both AUs are connected to the same Ethernet backbone.	*TrapSUMacAddr
*AUagingTRAP (4)	An AU trap indicating that an SU was aged out and removed from the ADB following its failure to acknowledge a certain number of consecutive frames transmitted to it.	*TrapSUMacAddr
*SUassociatedTRAP (6)	An SU trap indicating association with an AU. In addition to the MAC address information of the AU, the trap also includes information on the average RSSI of frames received from the AU.	*AssociatedAU *LastAUMacAddress *TrapRssiQuality *TrapLastRssiQuality
*SUWirelessQualityTRAP(7)	An SU trap, indicating that the quality of the wireless link has changed and dropped below (On) or has improved above (Off), defined by the *WirelessTrapThreshold. The threshold is in RSSI units.	*TrapToggle *UnitMacAddress *TrapRssiQuality
*AUWirelessQualityTRAP(20)	An AU trap, indicating that the quality of the wireless link with a specific SU has changed and dropped below (On) or has improved above (Off) a threshold defined by *WirelessTrapThreshold. The threshold is a percents (retransmissions as percentage of total transmissions).	*TrapToggle *TrapRTx
*PowerUpFromReset (101)	A trap indicating power up after Reset.	*UnitMacAddr
*AULossOfSyncTRAP (21)	A BS-AU trap indicating that the AU has lost (alarm on) or regained (alarm off) synchronization. Applicable only to units in which the Hopping Sync is configured to slave operation.	*TrapToggle *UnitMacAddress
*MonitorStatusTRAP (102)	A trap indicating that a log-in or log-out has been performed via the Monitor port or Telnet. Includes the log-in access right and the IP address of the PC performing Telnet (if access is via Monitor the address is 0)	*TrapLog *TrapAccessRights *TrapTelnetUserIpAddress
*ParameterChangedTRAP(103)	An AU or SU trap indicating a change in a CIR/MIR, IP Filter, Accounting (billing) or VLAN parameter.	*TrapParameterChanged
*GpsAlarmInTRAP (104)	A GU trap indicating a change in alarm-in status	*brzaccTrapToggle *AlarmName *AlarmNumber
*GpsAlarmOutTRAP (105)	A GU trap indicating a change in alarm-out status	*brzaccTrapToggle *AlarmName *AlarmNumber
*GpsUTCstatusTRAP (106)	A GU trap indicating a change in UTC status. On status is when the GU module receives UTC information from the GPS antenna. This information is useful only if the GU receives also PPS signals from the GPS antenna, indicated by an on status of Alarm In 5 (GPS Antenna Alarm).	*TrapToggle

Trap (Number)	Description	Variables
*NoAssociationsOnTRAP (201)	An IF-based AU alarm. Alarm was set on: The AU was reset 3 consecutive times as a result of no association with any SU, and before that the AU was associated with at least Minimum Number Of SUs.	*TrapAUAlarmsSeverity
*NoAssociationsOffTRAP (202)	Alarm was set off: At least one SU became associated with the AU. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	
*AllAssociationsLostOnTRAP (203)	Alarm was set on: No response from any SU, and the previous average number of responding SUs was at least Minimum Number Of SUs.	*TrapAUAlarmsSeverity *TrapAverageNumberOfRespondingSUs
*AllAssociationsLostOffTRAP (204)	Alarm was set off: At least one SU responded to last polling messages. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	*TrapCurrentNumberOfRespondingSUs
*AUTxPowerLevelDecreaseOnTRAP(205)	Alarm was set on: The decrease in the SU Rx Power Average Delta (the inverse value of the SU Rx Power Average Delta) is higher than the SU Rx Power Decrease Threshold, and the number of SUs that responded to both of the last two polling messages is at least 5.	*TrapAUAlarmsSeverity *TrapSURxPowerAverageDelta
*AUTxPowerLevelDecreaseOffTRAP (206)	The alarm will be set off after activating Clear All Alarms or after disabling the AU Alarms Option.	
*AURxSignalStrengthDecreaseOnTRAP(207)	Alarm was set on: The decrease in the AU Rx Power Average Delta (the inverse value of the AU Rx Power Average Delta) is higher than the AU Rx Power Decrease Threshold, and the number of SUs that responded to both of the last two polling messages is at least 5.	*TrapAUAlarmsSeverity *TrapAURxPowerAverageDelta
*AURxSignalStrengthDecreaseOffTRAP (208)	The alarm will be set off after activating Clear All Alarms or after disabling the AU Alarms Option.	

Trap (Number)	Description	Variables
*HighRetransmissionsRateOnTRAP (209)	Alarm was set on: Minor Severity Alarm: a. The Retransmissions Current Rate exceeds the Retransmissions Minor Alarm Threshold, and is higher than the Retransmissions Average Rate by at least Retransmissions Minor Alarm Minimum Delta. b. The Retransmissions Current Rate has dropped below the Retransmissions Major Alarm Threshold but is still higher than the Retransmissions Minor Alarm Threshold. Major Severity Alarm: The Retransmissions Current Rate became higher than the Retransmissions Major Alarm Threshold.	*TrapAUAlarmsSeverity *TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighRetransmissionsRateOffTRAP (210)	Alarm was set off: Minor Severity Alarm: The Retransmissions Current Rate dropped below the Retransmissions Minor Alarm Threshold. Major Severity Alarm: The Retransmissions Current Rate dropped below the Retransmissions Major Alarm Threshold. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	*TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighDroppedFramesRateOnTRAP (211)	Alarm was set on: Minor Severity Alarm: a. The Dropped Frames Current Rate exceeds the Dropped Frames Minor Alarm Threshold, and is higher than the Dropped Frames Average Rate by at least Dropped Frames Minor Alarm Minimum Delta. b. The Dropped Frames Current Rate has dropped below the Dropped Frames Major Alarm Threshold but is still higher than the Dropped Frames Minor Alarm Threshold. Major Severity Alarm: The Dropped Frames Current Rate became higher than the Dropped Frames Major Alarm Threshold.	*TrapAUAlarmsSeverity *TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighDroppedFramesRateOffTRAP (212)	Alarm was set off: Minor Severity Alarm: The Dropped Frames Current Rate dropped below the Dropped Frames Minor Alarm Threshold. Major Severity Alarm: The Dropped Frames Current Rate dropped below the Dropped Frames Major Alarm Threshold. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	*TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate

Trap (Number)	Description	Variables
*HighCRCErrorRateOnTRAP (213)	Alarm was set on: Minor Severity Alarm: a. The CRC Error Current Rate exceeds the CRC Error Minor Alarm Threshold, and is higher than the CRC Error Average Rate by at least CRC Error Minor Alarm Minimum Delta. b. The CRC Error Current Rate has dropped below the CRC Error Major Alarm Threshold but is still higher than the CRC Error Minor Alarm Threshold. Major Severity Alarm: The CRC Error Current Rate became higher than the CRC Error Major Alarm Threshold.	*TrapAUAlarmsSeverity *TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighCRCErrorRateOffTRAP (214)	Alarm was set off: Minor Severity Alarm: The CRC Error Current Rate dropped below the CRC Error Minor Alarm Threshold. Major Severity Alarm: The CRC Error Current Rate dropped below the CRC Error Major Alarm Threshold. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	*TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighDuplicateFramesRateOnTRAP (215)	Alarm was set on: Minor Severity Alarm: a. The Duplicate Frames Current Rate exceeds the Duplicate Frames Minor Alarm Threshold, and is higher than the Duplicate Frames Average Rate by at least Duplicate Frames Minor Alarm Minimum Delta. b. The Duplicate Frames Current Rate has dropped below the Duplicate Frames Major Alarm Threshold but is still higher than the Duplicate Frames Minor Alarm Threshold. Major Severity Alarm: The Duplicate Frames Current Rate became higher than the Duplicate Frames Major Alarm Threshold.	*TrapAUAlarmsSeverity *TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate
*HighDuplicateFramesRateOffTRAP (216)	Alarm was set off: Minor Severity Alarm: The Duplicate Frames Current Rate dropped below the Duplicate Frames Minor Alarm Threshold. Major Severity Alarm: The Duplicate Frames Current Rate dropped below the Duplicate Frames Major Alarm Threshold. The alarm will be set off also after activating Clear All Alarms or after disabling the AU Alarms Option.	*TrapTrafficStatisticsCurrentRate *TrapTrafficStatisticsAverageRate

Appendix D: RSSI to dBm Conversion Table

RSSI	dBM
71	-100
72	-99
74	-98
75	-97
77	-96
78	-95
81	-94
82	-93
83	-92
84	-91
85	-90
86	-89
88	-88
89	-87
90	-86
91	-85
92	-84
93	-83
94	-82
96	-81
97	-80
98	-79
99	-78
100	-77
101	-76
102	-75
103	-74
104	-73
105	-72
106	-71
107	-70
108	-69
110	-68
111	-67
112	-66
113	-65

RSSI	dBM
114	-64
115	-63
116	-62
118	-61
119	-60
120	-59
121	-58
122	-57
123	-56
125	-55
126	-54
127	-53
128	-52
129	-51
130	-50
131	-49
133	-48
134	-47
135	-46
136	-45
137	-44
138	-43
139	-42
141	-41
142	-40
143	-39
144	-38
145	-37
146	-36
148	-35
149	-34
150	-33
151	-32
152	-31
153	-30

Appendix E: Parameters List

Unit Control Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Change Unit Name	All	Up to 32 printable ASCII characters	Empty String	Yes
Change Read-only Password	All	Up to 8 printable ASCII characters	public	Yes – For access from Monitor or Telnet only
Change Installer Password	All	Up to 8 printable ASCII characters	user	Yes – For access from Monitor or Telnet only
Change Administrator Password	All	Up to 8 printable ASCII characters	private	Yes – For access from Monitor or Telnet only
Console Speed	All	9600, 19200, 38400, 57600, 115200	9600	No
Log Out Timer	All	1-999 minutes	5	Yes
Event Log Policy	All	Log All (TRC) Level, Message (MSG) Level, Warning (WRN) Level, Error (ERR) Level, Fatal (FTL) Level, Log None	Fatal (FTL) Level	Yes
Auto Configuration Option	All	Disable, Enable	Disable	Yes
SNMP Read EESSID	AU, SU	Disable, Enable	Disable	No

Site Survey Parameters

Parameter	Unit	Range	Default	Run-Time Updated
RSSI Display Option	AU, SU	RSSI, dBm	RSSI	Yes
AU Alarms Option	IF-based AU	Disable, Enable	Disable	Yes
Learning Period	IF-based AU	1 – 1440 (minutes)	30 (minutes)	Yes
Test Cycle	IF-based AU	1 – 1440 (minutes)	10 (minutes)	Yes
Retransmissions Minor Alarm Minimum Delta	IF-based AU	0 – 100 (%)	20 (%)	Yes
Retransmissions Minor Alarm Threshold	IF-based AU	1 – 100 (%)	30 (%)	Yes
Retransmissions Major Alarm Threshold	IF-based AU	1 – 100 (%)	60 (%)	Yes
Dropped Frames Minor Alarm Minimum Delta	IF-based AU	0 – 100 (%)	10 (%)	Yes
Dropped Frames Minor Alarm Threshold	IF-based AU	1 – 100 (%)	10 (%)	Yes
Dropped Frames Major alarm Threshold	IF-based AU	1 – 100 (%)	20 (%)	Yes
CRC Error Minor Alarm Minimum Delta	IF-based AU	0 – 100 (%)	20 (%)	Yes
CRC Error Minor Alarm Threshold	IF-based AU	1 – 100 (%)	40 (%)	Yes
CRC Error Major Alarm Threshold	IF-based AU	1 – 100 (%)	70 (%)	Yes

Parameter	Unit	Range	Default	Run-Time Updated
Duplicate Frames Minor Alarm Minimum Delta	IF-based AU	0 – 100 (%)	5 (%)	Yes
Duplicate Frames Minor Alarm Threshold	IF-based AU	1 – 100 (%)	5 (%)	Yes
Duplicate Frames Major alarm Threshold	IF-based AU	1 – 100 (%)	15 (%)	Yes
SU Rx Power Decrease Threshold	IF-based AU	1 – 99 (dBm)	15 (dBm)	Yes
AU Rx Power Decrease Threshold	IF-based AU	1 – 99 (dBm)	15 (dBm)	Yes
Minimum Number Of SUs	IF-based AU	1 – 254 (SUs)	5 (SUs)	Yes

IP Parameters

Parameter	Unit	Range	Default	Run-Time Updated
IP Address	All	IP address	10.0.0.1	No
Subnet Mask	All	IP address	255.0.0.0	No
Default Gateway Address	All	IP address	0.0.0.0	No
DHCP Option	All	Disable, DHCP Only, Automatic	Disable	No
Access to DHCP	AU, SU	From Wlan Only, From Ethernet Only, From Both Ethernet & Wlan	AU: From Ethernet Only SU: From Wlan Only	No

Air Interface Parameters

Parameter	Unit	Range	Default	Run-Time Updated
ESSID	AU, SU	Up to 31 printable ASCII characters	ESSID1	No
Operator ESSID Option	AU	Disable, Enable	Enable	No
Operator ESSID	AU	Up to 31 printable ASCII characters	ESSID1	No
Hopping Band (5.7 GHz Products)	AU, SU	ISM US FCC, ISM International, Flexible Hopping definition	ISM US FCC	No
Frequency Offset (5.7 GHz Products)	AU, SU	ISM US FCC: 0 - 45 (MHz) ISM International: 0 - 70 (MHz).	0	No
Hopping Shift	AU	Number of hopping frequencies minus 1	0	No
Flexible Hopping Definition	AU, SU		V:5.2 GHz: 5153 MHz. 5.7 GHz: 5726 MHz	
Scrambling Mode	AU, SU	Standard Scrambling, Manual Scrambling, Enhanced Scrambling	Standard Scrambling	No
Spanning Factor	AU	Depends on number of hopping frequencies	1	No

Parameter	Unit	Range	Default	Run-Time Updated
Hopping Sync	AU	Idle, Master, Slave	Idle	No
Best AU Support	SU	Disable, Enable	Disable	No
Number of Scanning Attempts	SU	1 – 255	20	Yes
Preferred AU MAC Address	SU	MAC Address	00-00-00-00-00-00 (no preferred AU)	Yes
Transmit Power Control	AU, SU	0 – 7	7	Yes
Receive Attenuation Control	AU, SU	0, 10dB, 25dB	0	No
Maximum Data Rate	AU, SU	1, 2 and 3Mbps	3Mbps	No
AU Transmission Rate Control	SU	Disable, Enable	Disable	No
Acknowledge Delay Limit	AU, SU	Low, Medium, High	Low	No
Maximum Number of Associations	AU	1 – 512	512	Yes
Call Aging Time	AU	1 (no aging), 2-50,000 (seconds)	1800 seconds	No
Maximum Voice Sessions	AU	0 – 50	12	Yes
ACSE Option	AU and GU	Disable, Enable	Disable	No
ACSE Maximum Voice Sessions	AU	0 – 21	21	Yes
ACSE Number Of Retransmissions For Data	AU, SU	0 – 100	6	No
ACSE Number Of Retransmissions For Voice	AU, SU with voice	0 – 100	30	No
ATPC Option	AU, SU	Disable, Enable	AU: Disable SU: Enable	Yes
Maximum RSSI Level	AU	-100 to 0 (dBm)	5.2 GHz: -69 (dBm) 5.7 GHz: -64 (dBm)	Yes
Minimum RSSI Level	AU	-100 to 0 (dBm)	5.2 GHz: -79 (dBm) 5.7 GHz: -74 (dBm)	Yes

Parameter	Unit	Range	Default	Run-Time Updated
Minimum Interval Between ATPC Messages	AU	0-3600 (seconds)	120 (seconds)	Yes
RSSI Memory Factor	AU	-1 to 32	5	Yes
ATPC Power Level Steps	AU	1-100 (%)	1	Yes
ATPC Maximum Last Level Time After Reset	SU	0-3600 (seconds)	30 (seconds)	Yes
ATPC Maximum Last Level Time After Synchronization Loss	SU	0-3600 (seconds)	120 (seconds)	Yes
Scanning Mode	SU	Active, Passive	Active	No
MAC Address Black List	AU		Empty List	Yes
Send Roaming SNAP	All SUs, except SU-BD, SU-BD1V	Disable, Enable	Disable	No

Network Management Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Access To Network Management	AU, SU	From Wlan Only, From Ethernet Only, From Both Ethernet & Wlan	From Both Ethernet & Wlan	No
Network Management Filtering	All	Disable, Activate Management IP Filter On Ethernet Port, Activate Management IP Filter On Wlan Port (not available in GU), Activate Management IP Filter On Both Ethernet & Wlan Ports (not available in GU),	Disable	No
Set Network Management IP Address	All	IP address	0.0.0.0 (all 3 entries)	Yes
Send SNMP Traps	All	Disable Traps Sending, Enable Traps Sending	Disable Traps Sending	Yes
SNPM Traps IP Destination	All	IP address	0.0.0.0 (all 3 entries)	No
SNMP Traps Community	All	Up to 14 printable ASCII characters	public (all 3 entries)	No
Send SU Associated AU Trap	AU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send AU Disassociated Trap	AU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send AU Aging Trap	AU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send AU Wireless Quality Trap	AU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send SU Associated Trap	SU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes

Parameter	Unit	Range	Default	Run-Time Updated
Send SU Wireless Quality Trap	SU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send Parameter Changed Trap	AU, SU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send GPS Alarm In Trap	GU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send GPS Alarm Out Trap	GU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send GPS UTC Status Trap	GU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send Power Up From Reset Trap	All	Disable Trap Sending, Enable Trap Sending	AU & GU: Enable Trap Sending SU: Disable Trap Sending	Yes
Send Monitor Status Trap	All	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send Cold \ Warm Start Trap	All	Disable Trap Sending, Enable Trap Sending	AU & GU: Enable Trap Sending. SU: Disable Trap Sending	Yes
Send AU Loss Of Sync Trap	BS-AU	Disable Trap Sending, Enable Trap Sending	Enable Trap Sending	Yes
Send AU Alarms Traps	IF-based AU	Disable Traps Sending, Enable Traps Sending	Enable Traps Sending	Yes

Bridge Parameters

Parameter	Unit	Range	Default	Run-Time Updated
VLAN ID-Data	SU	1 – 4094	1	No
VLAN ID – Management	AU, GU, SU without voice	1 – 4094, 65535	65535 (no VLAN)	No
VLAN ID – Voice & Management	SU with voice	1 – 4094, 65535	65535 (no VLAN)	No
VLAN Link Type	AU, SU	Hybrid Link, Trunk Link, Access Link (only in SU)	Hybrid Link	No
Voice Priority Tag Option	SU with voice	Disable, Enable	Disable	No
VLAN Forwarding Support	AU, SU	Disable, Enable	Disable	No
VLAN Forwarding ID	AU, SU	1 – 4094 (up to 20 entries)	Empty list	No
VLAN Relaying Support	AU	Disable, Enable	Disable	No
VLAN Relaying ID	AU	1 – 4094 (up to 20 entries)	Empty list	No
VLAN Priority – Data	AU, SU	0 – 7	0	No
VLAN Priority – Voice	SU with voice	0 – 7	6	Yes
VLAN Priority – Management	AU, SU, GU	0 – 7	SU with voice: 4 All other units: 0	No
VLAN Priority Threshold	AU, SU	0 – 7	4	Yes
Voice Packets ToS	SU with voice	0 – 255	0	Yes
ToS Precedence Threshold	AU, SU	0 – 7	3	Yes
Filter Option	SU	Disable, From Ethernet Only, From Wlan Only, Both From Ethernet & Wlan	Disable	Yes
DHCP Broadcast Override Filter	SU	Disable, Enable	Disable	Yes

Parameter	Unit	Range	Default	Run-Time Updated
PPPoE Broadcast Override Filter	SU	Disable, Enable	Disable	Yes
Parameter	Unit	Range	Default	Run-Time Updated
ARP Broadcast Override Filter	SU	Disable, Enable	Disable	Yes
LAN to WLAN Bridging Mode	AU	Reject Unknown, Forward Unknown	Forward Unknown	Yes
Bridge Aging Time	AU, SU	100 – 2000 seconds	AU, SU-BD, SU-BD1V: 300 All other SUs: 1800	No
Broadcast Relaying	AU	Disable, Enable	Enable	No
Unicast Relaying	AU	Disable, Enable	Enable	No
Ethernet Port Control	SU	Disable, Enable	Enable	No
Voice Port Control	SU with voice	Disable, Enable	Enable	No

Performance Parameters

Parameter	Unit	Range	Default	Run-Time Updated
RTS Threshold	AU, SU	20 – 1600 bytes	AU: 1600 SU: 60	No
Number of Retransmissions	AU, SU	1 – 100	1	No
Number of Retransmissions to Decrease Rate	AU, SU	0 – 10	0	No
Number of Dwells to Retransmit	AU, SU	0 – 9	2	No
Minimum Contention Window	AU, SU	7 - 255	31	No
Carrier Sense Level	AU, SU	-100 to -40 (dBm)	5.2 GHz: -90 (dBm) 5.7 GHz: -85 (dBm)	No
Maximum Multicast Rate	AU	1, 2, 3Mbps	1Mbps	Yes
Multi-Rate Support	AU, SU	Disable, Enable	Enable	No
Multi-Rate Decision Window Size	AU, SU	1 – 50	12	No
Number of Failures in Multi-Rate Decision Window	AU, SU	1 to Multi-Rate Decision window Size	8	No
Dwell Time	AU and GU	32, 64, 128	128	No
Noise Floor	AU, SU	-115 to -50 (dBm)	-112 (dBm)	No
Carrier To Interference Difference Level	AU, SU	6 to 60 (dB)	8(dB)	No

Service Parameters

Parameter	Unit	Range	Default	Run-Time Updated
User Filtering Option	SU	Disable, IP Only, User Defined Addresses Only, PPPoE Protocol Only	Disable	Yes
Set User Filter Address	SU	IP address (8 entries)	0.0.0.0 (all 8 entries)	Yes
Set User Filter Mask	SU	IP address (8 entries)	255.255.255.255 (all 8 entries)	Yes
Set User Filter Range	SU	0 - 255	0 (all 8 entries)	Yes
MIR/CIR Option	AU, SU	Disable, Enable	Disable	No
MIR: AU to SU	SU	32 – 2200Kbps	128Kbps	No
MIR: SU to AU	SU	32 – 2200Kbps	128Kbps	No
CIR: AU to SU	SU	0 – 2200Kbps	64Kbps	No
CIR: SU to AU	SU	0 – 2200Kbps	64Kbps	No
Maximum Burst Duration	AU, SU	0 – 2000 milliseconds	5 milliseconds	No
Maximum Delay	SU	300 – 10,000 milliseconds	5,000 milliseconds	No
Graceful Degradation Limit	AU	0 – 70 (%)	70 (%)	No
MIR Only Option	AU	Disable, Enable	Disable	Yes

RADIUS Parameters

Parameter	Unit	Range	Default	Run-Time Updated
User Name	SU	Up to 64 printable ASCII characters	The units' MAC Address	No
User Password	SU	Up to 64 printable ASCII characters	RadiusPassword1	No
Shared Secret	SU	Up to 20 characters	RadiusSecret1234	No
Authentication Option	SU	Disable, enable	Disable	No
RADIUS Server Authentication IP Address	SU	IP Address	0.0.0.0	No
RADIUS Server Authentication Port	SU	1000 to 65535	1812	No
Accounting Option	SU	Disable, enable	Disable	No
RADIUS Server Accounting IP Address	SU	IP Address	0.0.0.0	No
RADIUS Server Accounting Port	SU	1000 to 65535	1813	No
Accounting Interval	SU	60 to 6000 (seconds)	90 (seconds)	No

Security Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Authentication Algorithm	AU, SU	Open System, Shared Key Support All (AU only)	Open System	No
Default Key ID	SU	1 – 4	1	Yes
WEP Key # 1-4	AU, SU	10 Hexadecimal Digits	0000000000 (no key)	No

Voice Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Volume	SU with voice	-20 to 0 (dB)	-3dB	Yes
Echo Cancellation	SU with voice	Disable, Enable	Enable	Yes
Voice Codec	SU with voice	1 – 7654321 (use only the digits 1 – 7)	2134	No
G723 Frames Per Packet	SU with voice	1 – 8	2	No
G729 Frames Per Packet	SU with voice	1 – 12	6	No
G711 u-Law Frames Per Packet	SU with voice	1 – 16	12	No
G729 Frames Per Packet	SU with voice	1 – 16	12	No
Voice Activity Detection	SU with voice	Voice Activity Detection OFF, Voice Activity Detection G7231	Voice Activity Detection OFF	No

Dialing Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Pulse Dialing	SU with voice	Disable, Enable	Enable	No
Gatekeeper Option	SU with voice	Disable, Enable	Disable	No
Gatekeeper / Gateway IP Address	SU with voice	IP address	0.0.0.0	No
Alternate Gatekeeper Option	SU with voice	Disable, Enable	Disable	No
Alternate Gatekeeper IP Address	SU with voice	IP address	0.0.0.0	No
Telephone Number	SU with voice	Up to 10 decimal digits	0000000000	No
H323 Terminal ID	SU with voice	Up to 24 characters	X (No terminal ID)	No
IP Dialing Option	SU with voice	Disable, Enable	Enable	Yes
IP Dialing Indicator	SU with voice	up to 3 phone key-pad digits (0-9, *, #, A, B, C, D)	*	Yes
Automatic Prefix	SU with voice	up to 8 phone key-pad digits (0-9, *, #, A, B, C, D)	X (No prefix)	Yes
Fast Start	SU with voice	Disable, Enable	Enable	Yes
Information Transfer Capability	SU with voice	Speech, Unrestricted, Restricted, 3.1KHz audio, Unrestricted with tones, Video	Speech	No
Dialing Prefix Option	SU with voice	Disable, Enable, Enable & Block Inter-Regional Prefix	Disable	Yes
Inter-Regional Prefix	SU with voice	One phone key-pad digit (0-9, *, #, A, B, C, D) and X (no prefix).	0	Yes

Parameter	Unit	Range	Default	Run-Time Updated
International Prefix	SU with voice	One phone key-pad digit (0-9, *, #, A, B, C, D) and X (no prefix).	0	Yes
Registration TTL	SU with voice	0 (not active), 1 – 65535	0	No
DTMF Relay	SU with voice	Disable, Enable, Enable Proprietary	Enable	No
Parameter	Unit	Range	Default	Run-Time Updated
Endpoint Type	SU with voice	Terminal, Gateway	Terminal	No
Fax Relay Option	SU with voice	Disable, Enable	Disable	No
Fax Relay redundancy	SU with voice	0–5	3	No
Batter Polarity	SU with voice (Voice card rev. D and higher)	Forward Battery, Reverse Battery, Forward->Reverse Battery, Reverse->Forward Battery	Forward Battery	No
Caller ID	SU with voice (Voice card rev. D and higher)	Disable, ETSI 300659-1 DT-AS, ETSI 300659-1 RP-AS, ETSI 300659-1 Ringing, Bellcore 202 MDMF, Bellcore202SDMF	Disable	Yes
Stop dialing Timeout	SU with voice	3 – 60 seconds	5 seconds	Yes
Stop Dialing Indicator	SU with voice	Disable, Enable	Disable	Yes
Overlap Sending	SU with voice	Disable, Enable	Disable	No

Telephony Signals

Parameter	Unit	Range	Default	Run-Time Updated
Telephony Country Standard	SU with voice	Proprietary, Germany, Sweden, France, United Kingdom, Belgium, USA, Chile	USA	No
Frequency 1	SU with voice	0 – 3000Hz	Dial Tone: 350 Ring Back: 440 Busy: 480 Congestion: 480 Error: 480 High Level Error: 20	No
Frequency 1	SU with voice	0 – 3000Hz	Dial Tone: 350 Ring Back: 440 Busy: 480 Congestion: 480 Error: 480 High Level Error: 0 Ring Frequency: 20	No
Level 1	SU with voice	-32 to +3 (dBm)	Dial Tone: -13 Ring Back: -19 Busy: -14 Congestion: -24 Error: -24 High Level Error: 0 Ring Frequency: Null	No
Level 2	SU with voice	-32 to +3 (dBm)	Dial Tone: -13 Ring Back: -19 Busy: -14 Congestion: -24 Error: -24 High Level Error: 0 Ring Frequency: Null	No

Parameter	Unit	Range	Default	Run-Time Updated
Cadence On	SU with voice	100-10,000 milliseconds	Dial Tone: Ring Back: 1000 Busy: 500 Congestion: 1000 Error: 200 High Level Error: 0 Ring Frequency: 1000	
Parameter	Unit	Range	Default	Yes
Cadence Off	SU with voice	100-10,000 milliseconds	Dial Tone: Ring Back: 3000 Busy: 500 Congestion: 1000 Error: 200 High Level Error: 0 Ring Frequency: 3000	No
Duration	SU with voice	0 – 10,000 seconds	Dial Tone: 15 Ring Back: 60 Busy: 15 Congestion: 0 Error: 0 High Level Error: 0 Ring Frequency: 60	No
Min. Flash Detect Timeout	SU with voice	0-2,000 milliseconds	120	No
Max. Flash Detect Timeout	SU with voice	0-2,000 milliseconds	1000	No
Disconnect Timeout	SU with voice	0-2,000 milliseconds	1000	No
Inter-Digit Timeout	SU with voice	0-2,000 milliseconds	100	No
Called Party Release Timeout	SU with voice	0-10,000 milliseconds	0	No

Hopping Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Number of Hopping Frequencies	GU	2-151		No
Automatic Recovery Option	GU	Disable, Enable	Enable	Yes
Automatic Recovery Interval	GU	5 – 1440 (minutes)	15 (minutes)	Yes
ACSE Option	AU and GU	Disable, Enable	Disable	No
Dwell Time	AU and GU	32, 64, 128	128	No

Alarm Parameters

Parameter	Unit	Range	Default	Run-Time Updated
Alarm In Names	GU	Up to 31 printable ASCII characters	Alarm In 1 through Alarm In 4	Yes
Alarm Out Names	GU	Up to 31 printable ASCII characters	Alarm Out 1 through Alarm Out 3	Yes
Automatic Alarm Out Definition	GU	1 -10, N (None), A (Any)	N (None) for all 3 Alarm Outs	Yes
Alarm Out Control	GU	On, Off, Automatic	Automatic – for all 3 Alarm Outs	Yes

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